rch 1946

Chemical Industries

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Sweet potatoes arrive at new starch plant of U. S. Sugar

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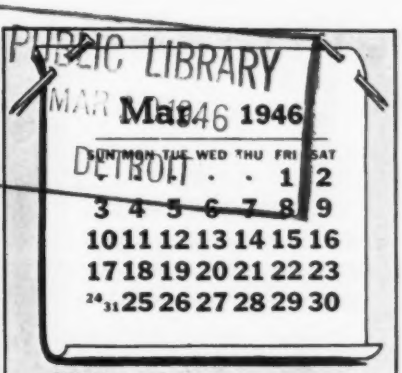

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Published monthly, except twice in November, at 1309 Noble St., Philadelphia 23, Pa., and entered as 2nd class matter July 15, 1944, at the Post Office at Philadelphia 4, Pa., under the Act of March 3, 1879. Subscription $4 a year, $6 for two years. Add $2 per year for postage to foreign countries other than Canada and Latin America. Single copies 50c, except November. Canadian subscriptions and remittances may be sent in Canadian funds to Chemical Industries, P. O. Box 100, Terminal A, Toronto, Canada. Copyrighted 1945, by MACLEAN-HUNTER Publishing Corporation, 522 Fifth Avenue, New York 18, N. Y., Murray Hill 2-7888; Horace T. Hunter, President; John R. Thompson, Vice-President and Treasurer; J. L. Frasier, Secretary. Office of Publication: 1309 Noble Street, Philadelphia 23, Pa.
EDITORIAL & EXECUTIVE OFFICES: 522 FIFTH AVE., NEW YORK 18, Murray Hill 2-7888. DISTRICT OFFICES: Chicago: 309 West Jackson Boulevard, Chicago 6, Ill., Harrison 7890. Los Angeles: 816 West Fifth Street, Los Angeles 13, Calif., Mutual 8512. San Francisco: 1105 Russ Bldg., San Francisco 4, Calif., Yukon 1069. London: 57 Goldsmith Avenue, Acton, London W3.
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THE READER WRITES

This department is operated as an open forum where readers are invited to express their views on problems of the chemical process industries or the chemical profession, or comment on articles that have appeared in CHEMICAL INDUSTRIES.

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To the editor of Chemical Industries:

We have been using a number of journal references for students in our classes. With continued use we find certain portions of our valuable bound journals becoming somewhat the worse for wear. Furthermore we are hoping to expand the use of references to original literature. With this in mind we are writing to you for permission to have the Bibliofilm Service (or other agency) microfilm the various articles. We are already subscribing for CHEMICAL INDUSTRIES and merely wish this as a means of making the different articles readily available without excessive damage to the original pages. The Bibliofilm Service only microfilms for "research purposes" but with your permission I shall order occasional articles on microfilm, signing the contract, but with your understanding as to how we intend to use the film.

JOHN W. CHITTUM
Department of Chemistry
The College of Wooster
Wooster, Ohio

We are glad to advise other readers, as we have Professor Chittum, that we have no objection to microfilming CHEMICAL INDUSTRIES *articles for private or library use. The making of microfilm copies for general sale or distribution, however, will be considered a violation of copyright.*—Editor

Liked Complaints Article

To the editor of Chemical Industries:

After reading your January issue, I felt impelled to compliment you and your staff on this outstanding issue.

CHEMICAL INDUSTRIES has been extremely helpful to us in many ways. The present issue represents, it would appear to us, a new peak in a steady, upward trend. In particular, we felt the article on complaints by Lynn A. Watt an entirely outstanding contribution, and also much enjoyed the article by Leffingwell and Lesser, Mr. Carmen's analysis of the plastics outlook, and, in fact, all of the articles in this really outstanding issue.

J. BJORKSTEN, Ph. D.
185 Wabash Avenue
Chicago 1, Ill.

"Presearch" Research

To the editor of Chemical Industries:

I note in your January issue the suggestion by our friend Matthew Braidech to use the term "presearch". It might be of interest to you that this word was trade marked by Ben Nash a number of years ago. In fact, if you have not read Ben Nash's book "The Development of Marketable Products and Their Packagings", I would like to recommend it to you. It is published by McGraw-Hill. In that book you will read about the word "presearch".

ROBERT S. ARIES, Consulting Engineer
94 Livingston Street
Brooklyn 2, New York

Market Research Series

To the editor of Chemical Industries:

May I offer my congratulations on the excellent series of articles currently appearing in CHEMICAL INDUSTRIES on "Information Sources for Chemical Market Research". They should prove an invaluable aid in the knotty problem of market surveys.

MIRIAM T. FRIEND, Librarian
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Classification System

To the editor of Chemical Industries:

I read with much interest Miss Irene Strieby's letter to you which was published in the February issue of CHEMICAL INDUSTRIES. There is a great need for a basic subject heading list for government documents dealing with the chemical industry.

In 1944 when I spoke before the American Chemical Society on the use of government documents in chemical research, it was my intention to organize my material along subject rather than along departmental lines. However, lack of time prevented my doing it. I do believe that much of the material appearing in many of the government publications is lost because of lack of a good means of filing it by subject. It would seem to me that if you could arrange to do the work, as you suggested you might, from the point of the various chemical fields, it would be a most useful project.

FLORENCE HARDEN, Librarian
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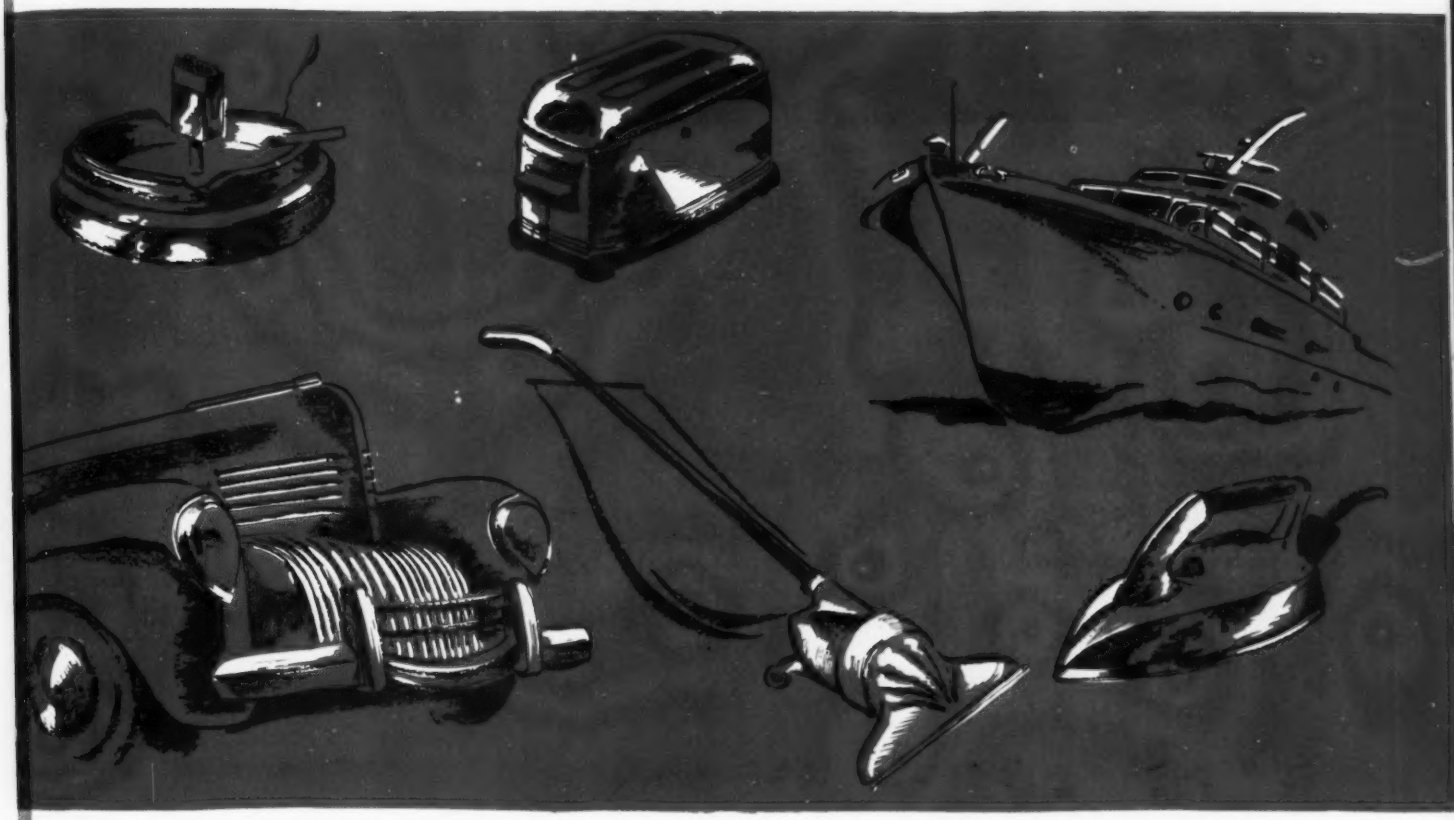

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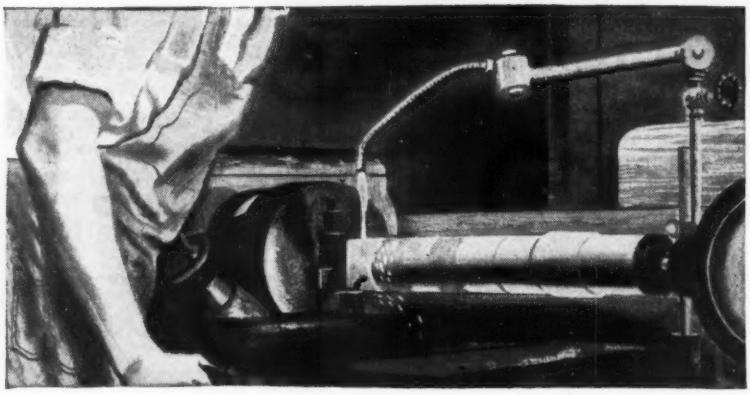

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T. N. SANDIFER *reporting*

Government Controls . . . Natural Gas Policy . . . TVA Phosphate War Plant Decontamination . . . Shipyard Conversion Possibilities Nicotine Sulphate Shortage . . . Mineral Deposit Legislation

Government Control Prospects

The coming weeks will see a major struggle between the Administration and Congress for indefinite prolongation of current Government controls in industry and over business.

Specifically, the President has asked Congress for extension beyond the statutory June 30, 1946, deadline, of Civilian Production Administration and the Office of Price Administration. He has also asked for extension of numerous supplementary Federal war powers, and Federal activities launched primarily as emergency measures. He may be disappointed in what he gets from Congress.

The badly scrambled wage-price situation in late February and early March has made it difficult to determine in Congress just what may be needed. The situation is mentioned here because it will undoubtedly affect the pace of industrial recovery in the coming spring and summer.

In the case of both control agencies, the industrial outlook is further affected by the fact that many of the more heavyweight industry members have either returned to their private affairs, or will do so at the first opportunity, which means that policies will be in the hands of more bureaucratic-minded and minor functionaries hereafter. Priorities in some fields will be necessary for an indefinite period, it is expected, due to strike conditions and the slower production pace.

Pipe Line Recommendations Opposed

As was generally anticipated in industry circles, the Surplus Property Administration report to Congress, opposing conversion of the Government's surplus pipe lines to natural gas transportation instead of oil, met widespread adverse comment in the industries concerned and in Congress.

The immediate result was passage by the Senate, upon recommendation of the O'Mahoney investigating committee, of a resolution extending to March 15, the time in which the report could be accepted or disapproved. A motion for the same purpose is pending in the House, and is expected to carry.

This action is necessary as, under the law, a report on disposal of surplus properties must be acted on by Congress within 30 days. As soon as the SPA report became public, however, interested parties informed the O'Mahoney committee that they wished to file rebuttals, either through briefs, or in further testimony.

Informed opinion is that conversion of the lines for natural gas purposes is still in the picture and Congress may well take formal exception to the report's finding that such use would be only a last resort. Both in testimony before the committee investigating the matter, and in conclusions reached after a survey prepared for the Reconstruction Finance Corporation, there was substantial agreement that use of the Government pipelines by natural gas interests was the most economically sound plan for their disposition.

Natural Gas Investigation Takes New Turn

The recent further hearings, at Houston, Tex., in the series being conducted under Federal Power Commission auspices, looking to establishment of a firmer national policy on gas conservation, with emphasis on Federal control, has taken a different trend from what was generally expected by FPC authorities. Witnesses surprised the hearing by their preponderant sentiment for continued State, rather than Federal controls.

Expansion of Pipe Line Facilities

Expansion, as a result of the war, of privately-owned, refined products pipelines has provided facilities enabling further penetration of markets previously served by other forms of transportation, the Interstate Commerce Commission points out, in a report to Congress.

There also has been expansion of crude oil lines, but made in accordance with the long-term programs of the oil companies. All of these will pose peace-time problems, the Commission noted in connection with transition to peace operations, and the impingement of new transportation systems on more established facilities.

From 1941 through 1944, approximately 14,000 miles of emergency trunk pipelines were either constructed, converted, or reversed as to direction of flow. In addition, about 3800 miles of other lines were built, and substantial expenditures made by private and Government sources, in effecting a considerable expansion of the capacity of existing lines.

The matter of again restoring the normal direction of flow in pipelines where the direction was reversed as a war measure, has caused considerable study, and is a reconversion problem, the Commission states. In fact, the Commission has advised Congress that costs involved in restoring the pre-war direction of flow in certain private pipelines may be borne partly by the Government.

Transfer Office of Research and Development

The Office of Production Research and Development has been transferred to the Department of Commerce, from the more fleeting jurisdiction of the Civilian Production Administration.

The transfer was made in anticipation of the creation of an Office of Technical Service in the Department of Commerce, as called for in pending legislation. Uncompleted war research and development contracts will not be transferred, but remain under CPA.

Decontamination Problem

As a result of the intensive production for war of explosives and chemicals, large areas of land, and various types of property, will require extensive decontamination before being restored to normal use. Some equipment, machinery and construction material in approximately 25 ordnance plants has proved to be unredeemable, in fact, because of chemical contamination.

As an instance of the danger, a case was reported to the War Assets Corporation, of an experienced employee los-

ing an arm in a powder plant explosion, due to contamination of a small wooden tub which he was endeavoring to repair. Although several days had been spent in eliminating explosive hazards, and it was thought the vessel was safe, the explosion occurred when the worker applied a wrench to a pipe connected with the tub.

In the case of some land on which buildings used for explosive production stood, it is reported that explosions can be caused by merely throwing a rock into the ditches, which formerly drained waste, but are now dry. Some buildings have become so saturated with harmful chemicals and explosives particles, such as mix houses, that they must be entirely removed.

In certain instances, buildings may be made safe by removing the lead covering from the floor, as where TNT was manufactured, and destroying any parts of the floor that have become contaminated. In fuse plants, where black powder was used, it is necessary only to remove the insulation and inside lining of the building, so that water can destroy the black powder residue.

However, the problem has many new aspects, and is causing considerable concern, in the case of properties being sold as surplus, or being reconverted.

TVA Studies Defluorination

The request made by TVA to the Interstate Commerce Commission to intervene in a rate case stemming from a complaint by Coronet Phosphate Co. and other manufacturers against certain rail rates on the products, revealed that TVA now has a 120 ton per day tricalcium phosphate unit in operation at Godwin, Tenn.

Although it has been known for some time that TVA has been conducting experiments on a silica fusion process for phosphate defluorination, the hearing provided some of the first details of the implementation of these production activities. In operation since June of last year, TVA has shipped carload quantities of its phosphate to Alabama, Tennessee, Kentucky, North Carolina, Georgia, Mississippi, and Virginia, for use in connection with its fertilizer demonstration program.

Surplus Shipyards Potentialities

Among the disposal possibilities now being studied, in the case of surplus Government shipyards, are said to be sale of the sites for oil refineries, oil tank farms, copra-oil plants, portland cement plants, imported ore smelters, pulp mills requiring rail and water facilities, phosphate fertilizer plants, and chemical plants. The cost of land and development in these yards represents about a fifth of the Government outlay of $158,400,000 for east coast yards alone, and it is in this field primarily that the Government disposal authorities have much hope of recovering what was put into an essentially war activity.

Nicotine Sulphate Shortage

Nicotine sulphate supplies are expected to be only about 80 percent of that available in 1945, according to estimates reported here. Probable demand in 1946 is placed at 1,200,000 pounds, against production of 100,000 pounds short of this total. Unless present policy is changed, there will be no government subsidy of production this year, as there was in 1945, it is understood, due to the favorable tobacco price level, which would require an inordinate amount of subsidy to divert tobacco to sulphate production.

Mineral Deposits Legislation

The bill, S. 1781, has been introduced by Senator Gossett, Idaho, on behalf of himself and a number of Senators of interested Western states, to provide for field stations to be maintained by the Bureau of Mines, in the interest of re-establishing mineral reserves, fostering research in mineral resources of the country. The bill is before the Committee on Mines and Mining, of the Senate, for study.

Chemical Warfare Association Formed

Organizations of the Chemical Warfare Association, to carry into peace years the associations of war activity, and to foster developments launched in the war period, was announced early in February.

Major General Alden H. Waitt, chief of CWS, was named honorary president, and Colonel Herbert K. Bear, temporary president.

CWS Product Goes Civilian

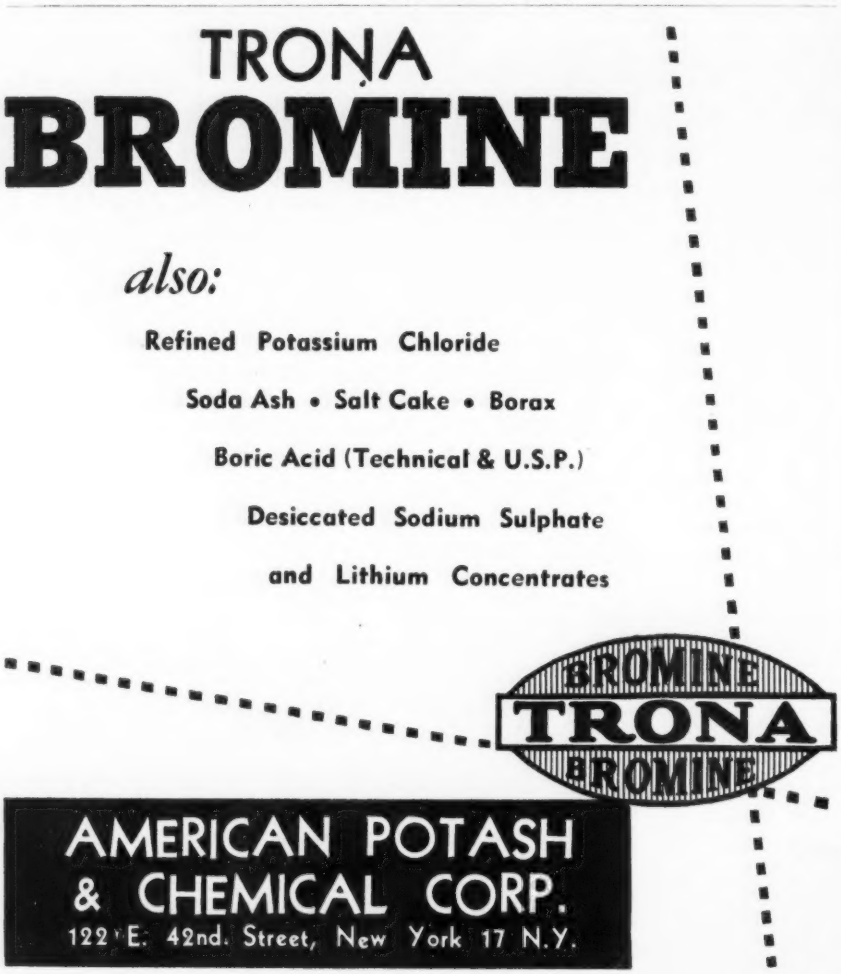
Activated carbon, or activated charcoal, used for gas masks in both World War I and II, may be useful in cheaper air conditioning and air purification, Chemical Warfare Service reports.

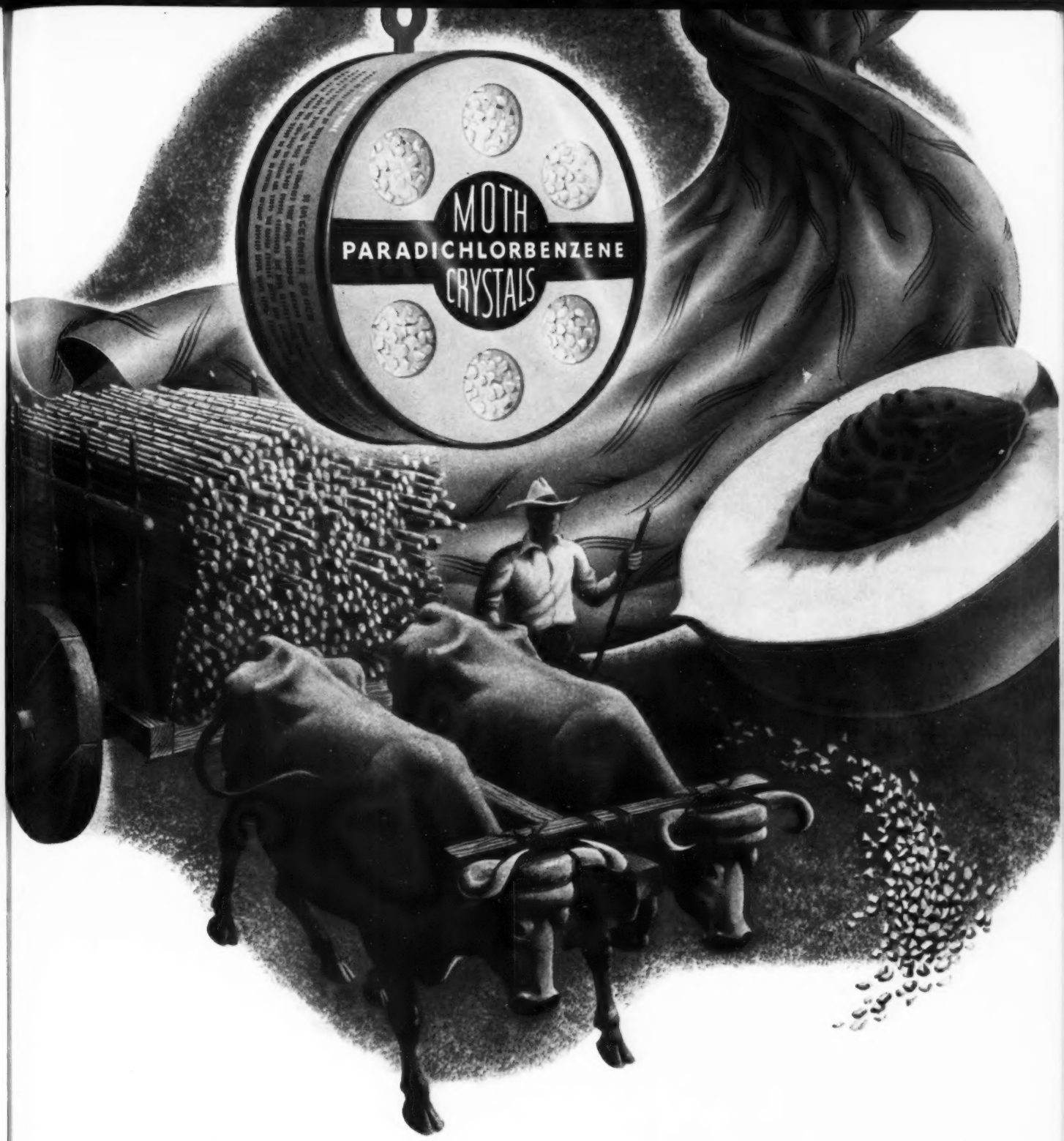
New Chief of WAC

Lieutenant General Edmund B. Gregory, who served as Quartermaster General of the United States Army during the war, has assumed his duties as chairman of the War Assets Corporation, which will henceforward direct the disposal of surplus property.

Tariff Commission Reports

Included among subjects on which Tariff Commission experts are currently working are import situations in mercury, iron and steel, and aluminum. The last named two are scheduled to be ready shortly, it is understood.





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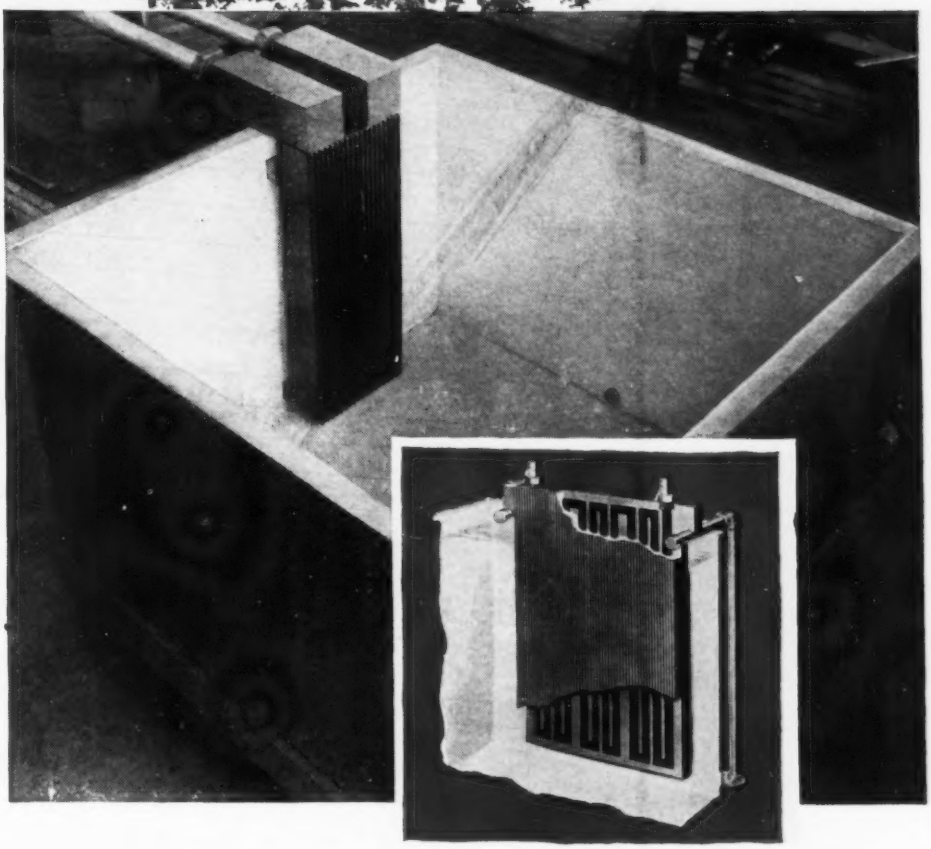

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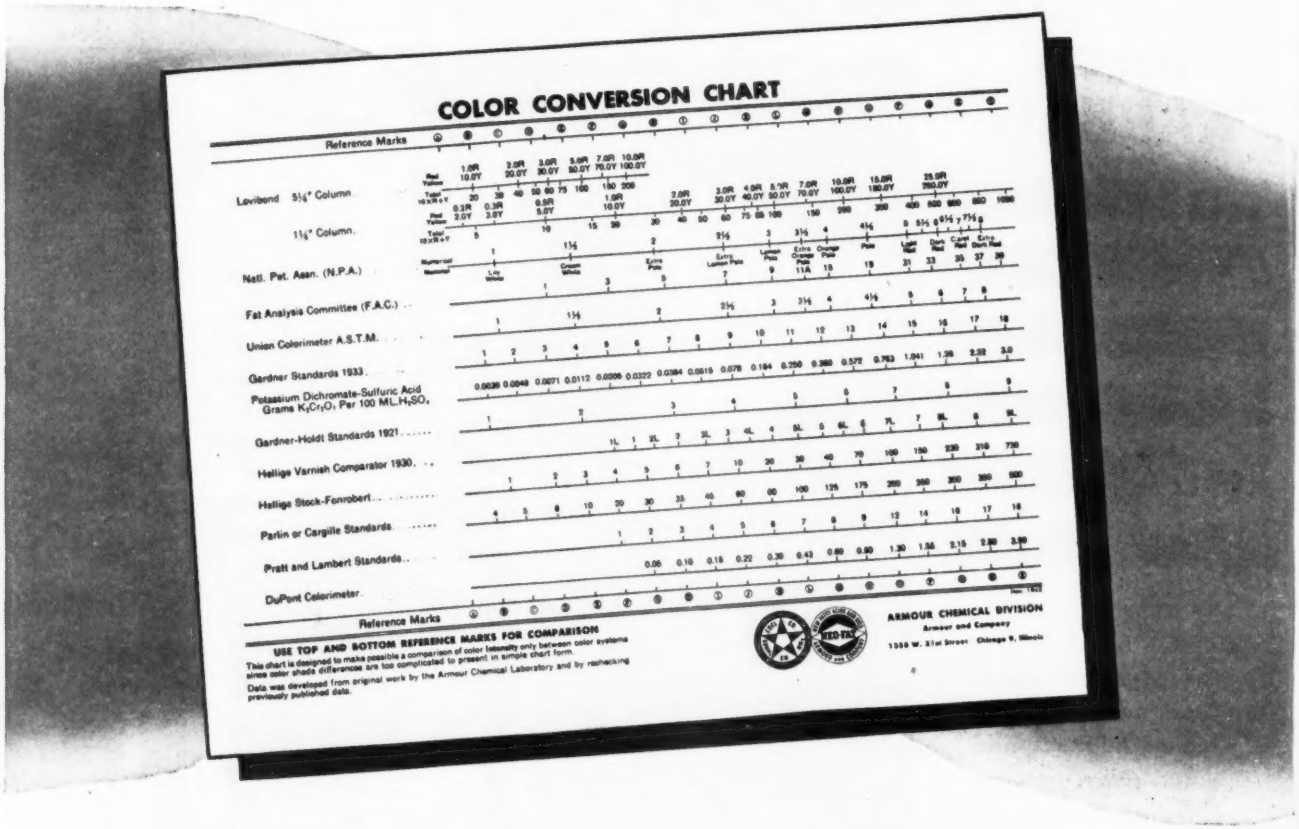
HANDY NEW COLOR CONVERSION CHART!


COLOR CONVERSION CHART
Reference Marks
Lovibond 5¼" Column
1¼" Column
Natl. Pet. Assn. (N.P.A.)
Fat Analysis Committee (F.A.C.)
Union Colorimeter A.S.T.M.
Gardner Standards 1933
Potassium Dichromate-Sulfuric Acid Grams $K_2Cr_2O_7$ Per 100 ML H_2SO_4
Gardner-Holdt Standards 1921
Hellige Varnish Comparator 1930
Hellige Stock-Fenrobert
Parlin or Cargille Standards
Pratt and Lambert Standards
DuPont Colorimeter
USE TOP AND BOTTOM REFERENCE MARKS FOR COMPARISON
This chart is designed to make possible a comparison of color intensity only between color systems since color shade differences are too complicated to present in simple chart form.
Data was developed from original work by the Armour Chemical Laboratory and by rechecking previously published data.
ARMOUR CHEMICAL DIVISION
Armour and Company
1353 W. 31st Street Chicago 9, Illinois

Gives Quick, Accurate Comparisons Between Any of the 12 Major Color Density Scales!

Printed on sturdy cardboard, 8½" x 11", for easy use and filing, this chart covers the complete commonly-used color density range.

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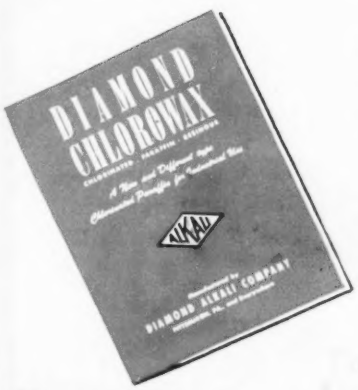

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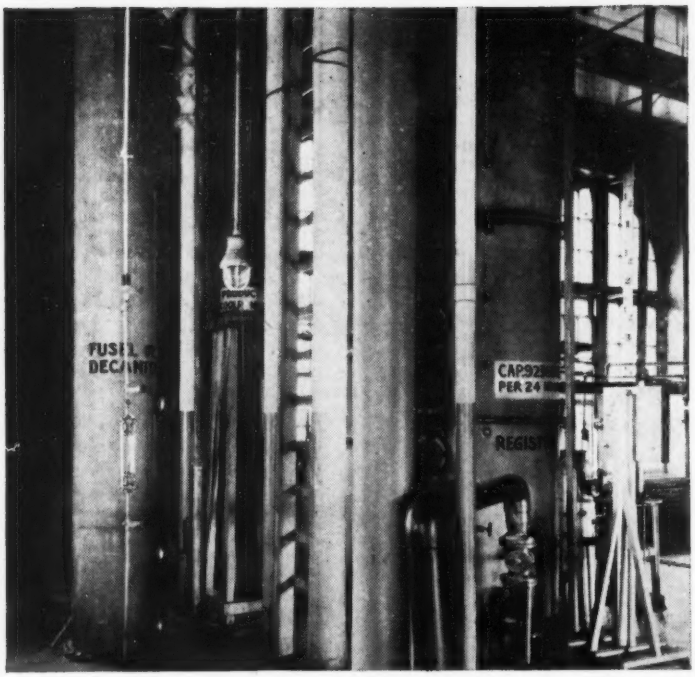


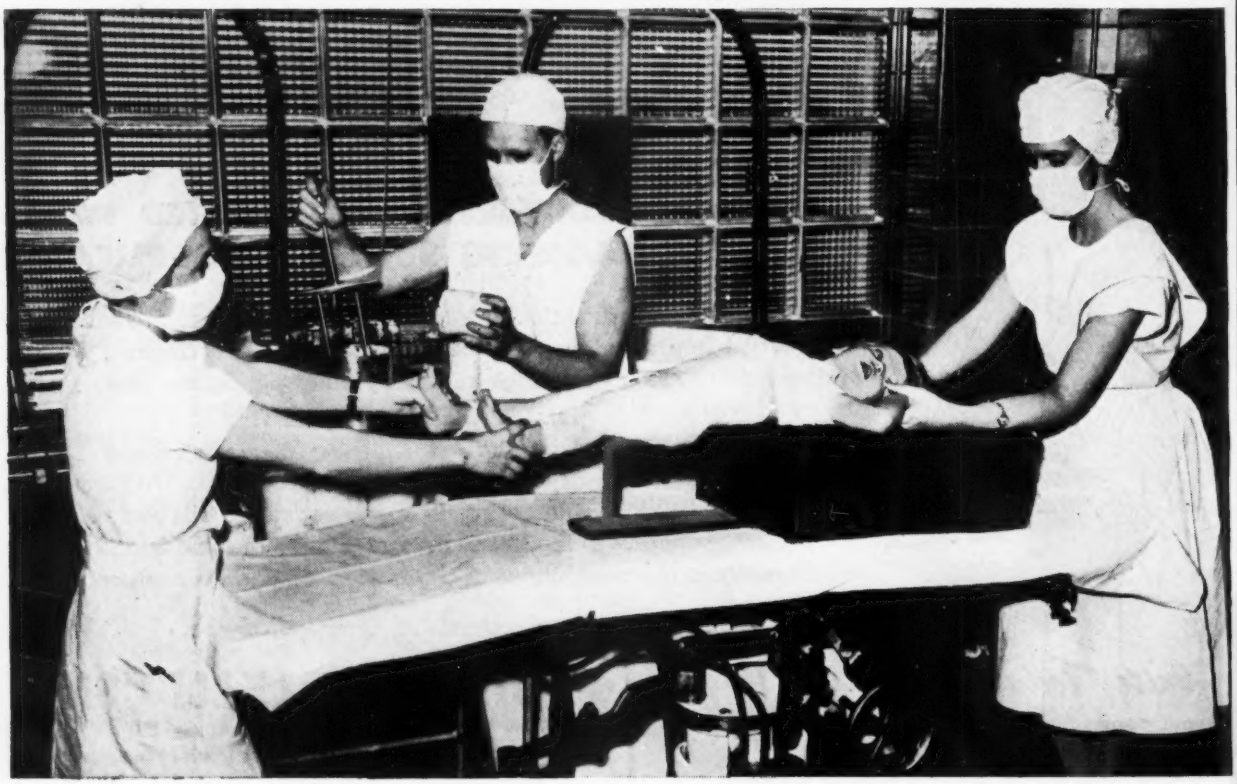
(*Above*) **FIBERGLAS PACKING** in fusel oil decanters has greatly increased efficiency in the distilling industry by providing larger filtration surface areas.

GLASS FIBERS IMPROVE PAPER, PLASTICS, ABRASIVES, PAINT, AND INDUSTRIAL PROCESSING

The use of milled glass fibers has speeded and increased the efficiency of industrial processing, alleviated human suffering, improved old products, and created new ones. Dispersed in filtering paper, Fiberglas, for instance, has speeded production of high-octane gasoline and increased distilling efficiency by providing more uniform capillarity. In laminating paper, Fiberglas speeds impregnation by the resin and reduces curing time. In melamine plastics, glass fibers increase impact strength and arc resistance. They improve strength and performance of abrasive cutting wheels. New, lightweight glass and plastic casts enable patients to bathe and move about while convalescing. In aviation, Fiberglas provides heat and sound insulation. In the form of cloth, Fiberglas is flame-proof, impervious to moisture penetration, mold, and other deteriorating influences.

For direct civilian use, the heat insulation properties of Fiberglas and its extremely light weight make it particularly adaptable for inner linings for comforters, sleeping bags, hunting jackets, and other cold-weather, out-of-door clothing.

(*Below*) **FIBERGLAS PLASTIC CASTS** weigh only ¼ to ⅙ as much as plaster casts and do not block X-ray penetration. They are immersed in setting solution, wrapped on, and allowed to dry until rigid.



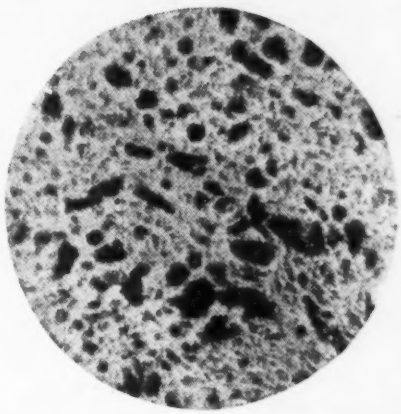
CHEMICAL NEWSFRONT

ISO-BEESWAX**, A CONTROLLED, UNIFORM EMULSIFYING AGENT FOR SOFT CREAMS

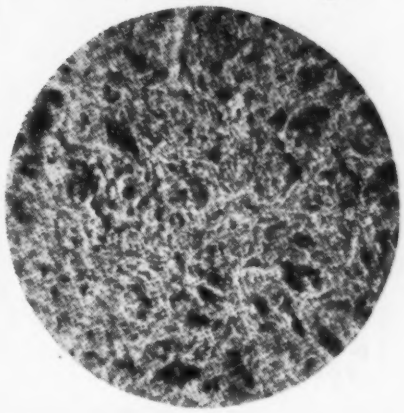
Iso-Beeswax was developed by Cyanamid for use in manufacture of modern soft cleansing creams. Leading cosmeticians report that it is more economical to use than natural beeswax, is more uniform in quality, is easy melting in flake form, and produces creams that are softer, smoother, glossier, and more stable over long periods of time.

Iso-Beeswax is a pale yellow wax, containing selected grades of natural beeswax, to which are added, under careful chemical control, emulsifying and stabilizing agents from various other natural and synthetic sources.

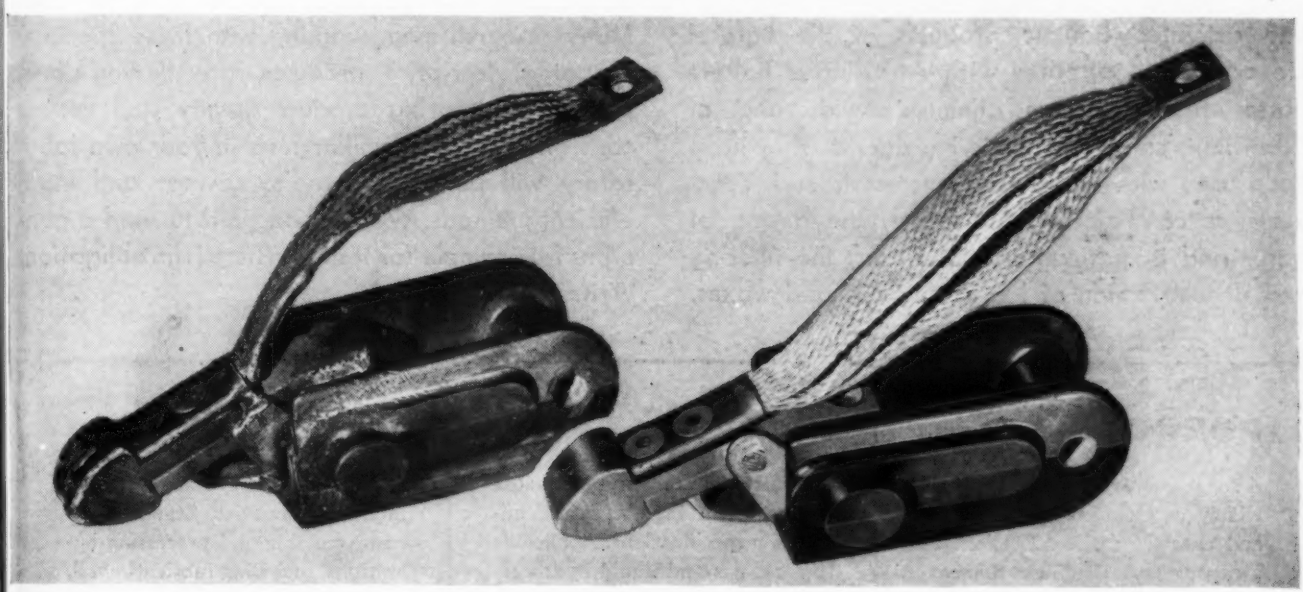
Full details on Iso-Beeswax formula and a copy of our new booklet, "Iso-Beeswax, a Controlled, Uniform Emulsifying Agent for Soft Creams," may be obtained by addressing Specialties Products Division, American Cyanamid & Chemical Corporation.



(*Above*) Photomicrograph (100x) shows soft cream made with pure U.S.P. beeswax, shortly after making. Note here a good emulsion, but not a perfect elimination of coarseness.



(*Above*) Photomicrograph (100x) shows identical cream except that Iso-Beeswax has been substituted. Note superior emulsion, smoothness in texture, with no grain or flake.



(*Above*) **THIS IS WHAT YOU CALL ARC RESISTANCE!** The short circuit which literally fused the metal portions of the old contactor (left) for heavy-duty mining machinery had no effect on the MELMAC* plastic insulating piece! Compare the old with a new contactor (right) and note how MELMAC plastic insulation was undamaged by arc or heat. MELMAC insulation, now employed on all such contactors and electric control made by the Joy Manufacturing Company for mining machinery, has reduced the hazards of many mining operations. The material, developed by Cyanamid's Plastics Division, practically eliminates breakdown of insulation in electric equipment because of its high dielectric strength, resistance to arcing, and impact and flexural strength which withstand damage from shock and vibration under severe operating conditions. *Reg. U. S. Pat. Off. **Trade-Mark

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Many research men, working with these specially prepared, low-price products, are finding them useful in improving product quality and cutting costs. It is possible similar tests in your own laboratory will point the way to savings and more efficient methods. We shall be glad to send a generous free sample for testing. There is no obligation. Write for yours today.

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3 ethanolamines...

Diethylethanolamine
$(C_2H_5)_2NC_2H_4OH$

...is used chiefly in the syntheses of antispasmodics, anti-malarials, and pain-relieving pharmaceuticals. Its fatty esters are of particular value as emulsifying agents for waxes and oils to be applied under acidic conditions, as in the case of textile waterproofing compounds. These oil-soluble esters can be used in inks and paints as surface-active materials and may have value as rust inhibitors in petroleum products.

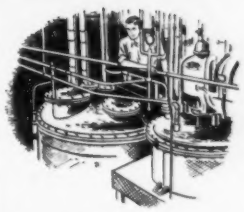
Dimethylethanolamine
$(CH_3)_2NC_2H_4OH$

...is an intermediate in the synthesis of compounds used as corrosion inhibitors, anesthetics, acetate rayon dyestuffs, and textile auxiliaries and lubricants. Dimethylethanolamine forms highly surface-active esters which are well suited to cationic flotation processes. It is also valuable itself as a corrosion inhibitor in return condensate low-pressure steam systems.

Methyldiethanolamine
$CH_3N(C_2H_4OH)_2$

...is an intermediate in the manufacture of resins, pharmaceuticals, insecticide intermediates, emulsifying agents, and textile agents and dyestuffs. Methyldiethanolamine is a tertiary amine with two highly active hydroxyl groups and is a valuable product for the preparation of a wide variety of compounds.

FOR MANY APPLICATIONS, INCLUDING . . .



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FUMIGANTS	RESINS
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GASOLINE	SYNTHETIC RUBBER
GLASS	SOAP
GLUE	SODA
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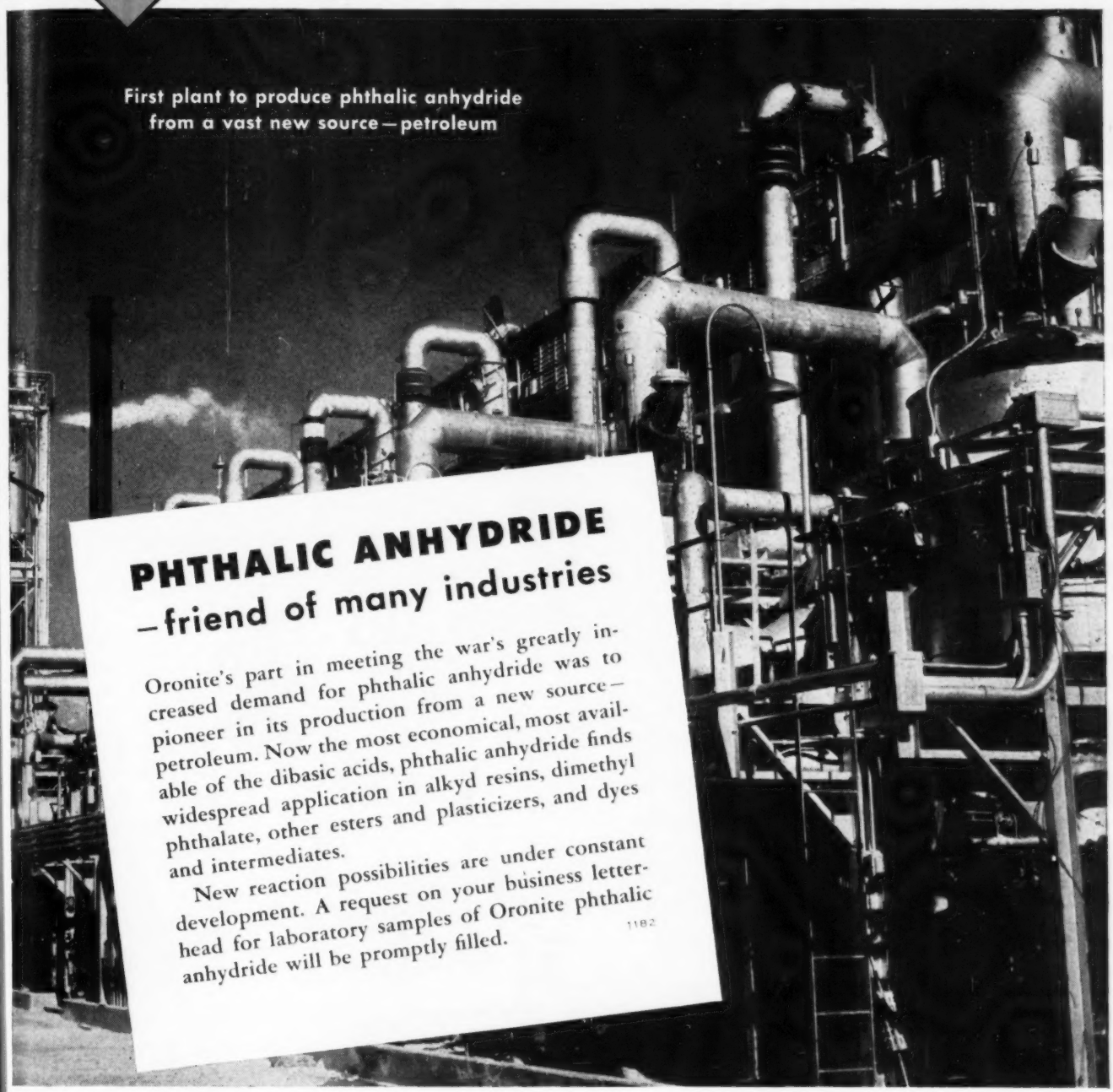


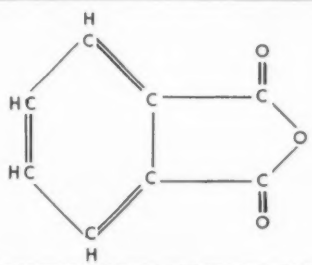
First plant to produce phthalic anhydride from a vast new source—petroleum

PHTHALIC ANHYDRIDE —friend of many industries

Oronite's part in meeting the war's greatly increased demand for phthalic anhydride was to pioneer in its production from a new source—petroleum. Now the most economical, most available of the dibasic acids, phthalic anhydride finds widespread application in alkyd resins, dimethyl phthalate, other esters and plasticizers, and dyes and intermediates.

New reaction possibilities are under constant development. A request on your business letterhead for laboratory samples of Oronite phthalic anhydride will be promptly filled.

1182



TYPICAL TESTS:

Phthalic Anhydride, Per Cent	99.7
Freezing Point, Deg. Cent. Min.	130.5
Color, Hazen	80
Appearance	Pure white free-flowing flakes

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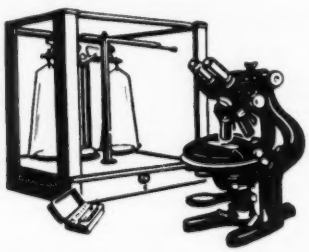

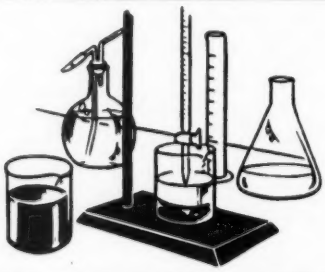

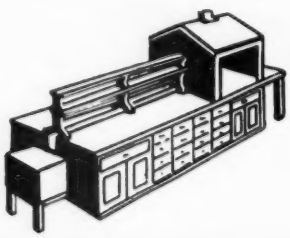

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Carbon Tetrachloride	Muriatic Acid	Stripper, Textile	Tartar Emetic
Chlorine	Nitric Acid	Sulphuric Acid	Tartaric Acid
Citric Acid			Titanium Tetrachloride

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Stauffer CHEMICALS SINCE 1885

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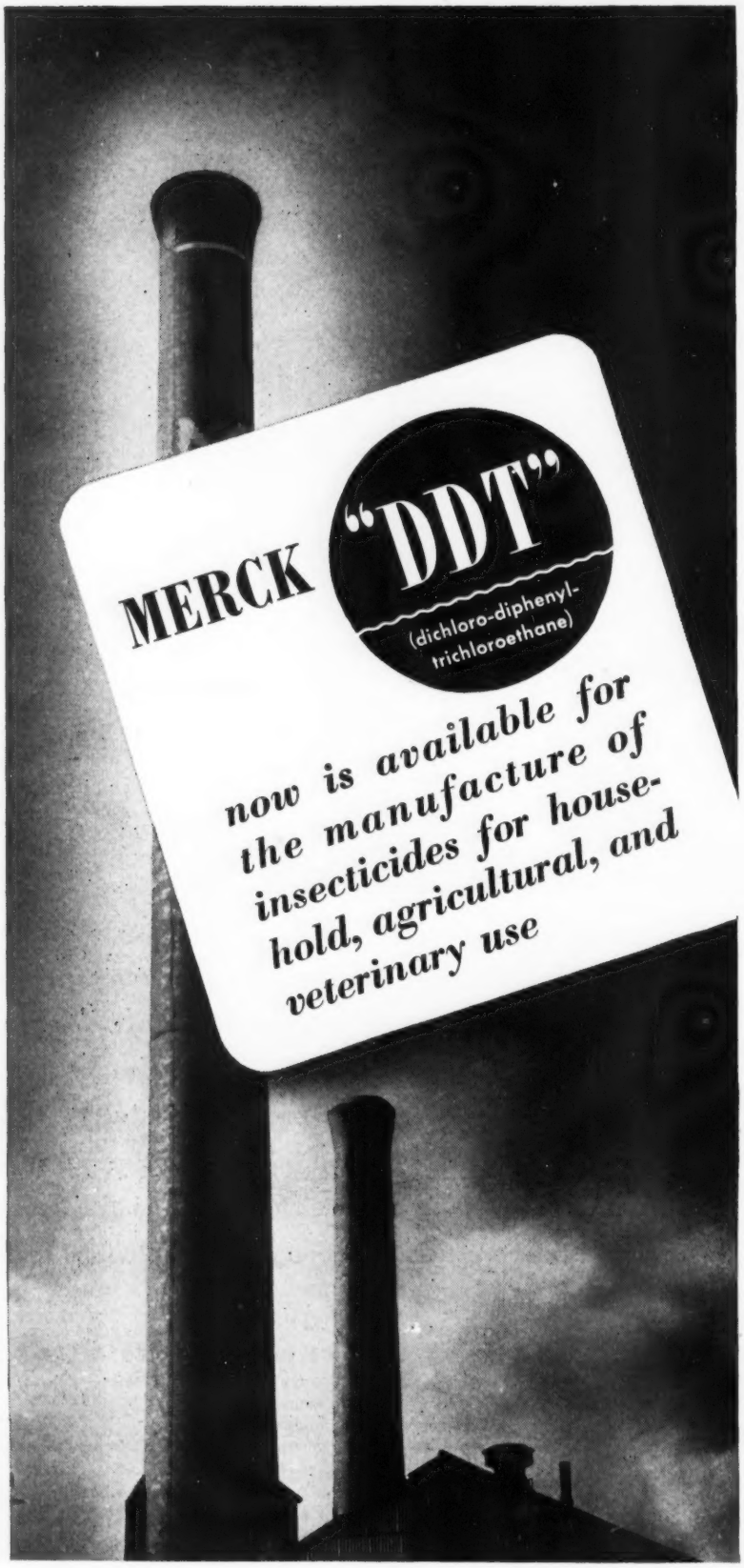
MERCK "DDT"
(dichloro-diphenyl-trichloroethane)
now is available for the manufacture of insecticides for household, agricultural, and veterinary use

NOW that its job of protecting the health of American Service men overseas is almost completed, Merck "DDT" Technical is being released to manufacturers for the production of modern, effective insecticides.

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"DDT"

(*dichloro-diphenyl-trichloroethane*)

TECHNICAL

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For Manufacturing Purposes Only

As production levels rise and current commitments are provided for, we will find increasing opportunities to co-operate with manufacturers of "DDT" insecticides and to serve as a basic and prime source of supply for this product.

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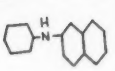
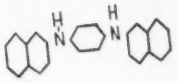
B. F. Goodrich Chemical Company

has available for sale these organic chemicals



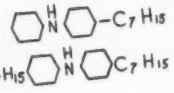
Phenyl B Naphthyl Amine

Distilled—Available in commercial quantities
M. P. 107°
Purity 99.5%
Commercial—Available in commercial quantities
M. P. 106°
Purity 98.0%



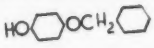
Di B Naphthyl p Phenylene Diamine

Available in commercial quantities
M. P. 230° C
Purity 98%



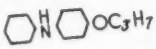
Mixed Mono-and Diheptyl Diphenyl Amines

Available in commercial quantities
Distillation range—145-245
(3.0 mm)
Purity 98%



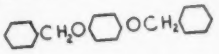
Monobenzyl Ether of Hydroquinone

Available in commercial quantities
M. P. 113°
Purity 90%



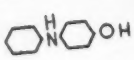
Isopropoxy Diphenyl Amine

Available in commercial quantities
M. P. 78°
Purity 92% min.



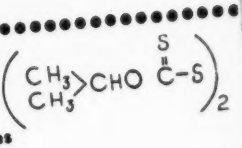
Dibenzyl Ether of Hydroquinone

Available in Pilot Plant quantities
M. P. 119°
Purity 85%



p Hydroxy Diphenyl Amine

Available in commercial quantities
M. P. 150
Purity 92%

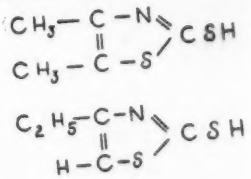


Di Isopropyl Dixanthogen

Available in commercial quantities
M. P. 52°
Purity 98%

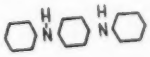
N-Nitroso Diphenyl Amine

Available in commercial quantities
M. P. 62°
Purity 97%



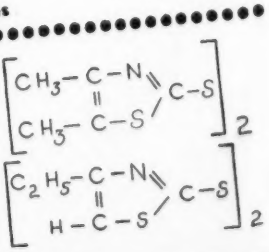
Mixed Ethyl and Dimethyl Mercaptothiazoles

Available in commercial quantities
M. P. 136-153°
Purity Approximately 85% dimethyl and 15% ethyl mercaptothiazoles



Diphenyl p Phenylene Diamine

Available in commercial quantities
M. P. 144°
Purity 92%



Mixed Aliphatic Thiazyl Disulfides

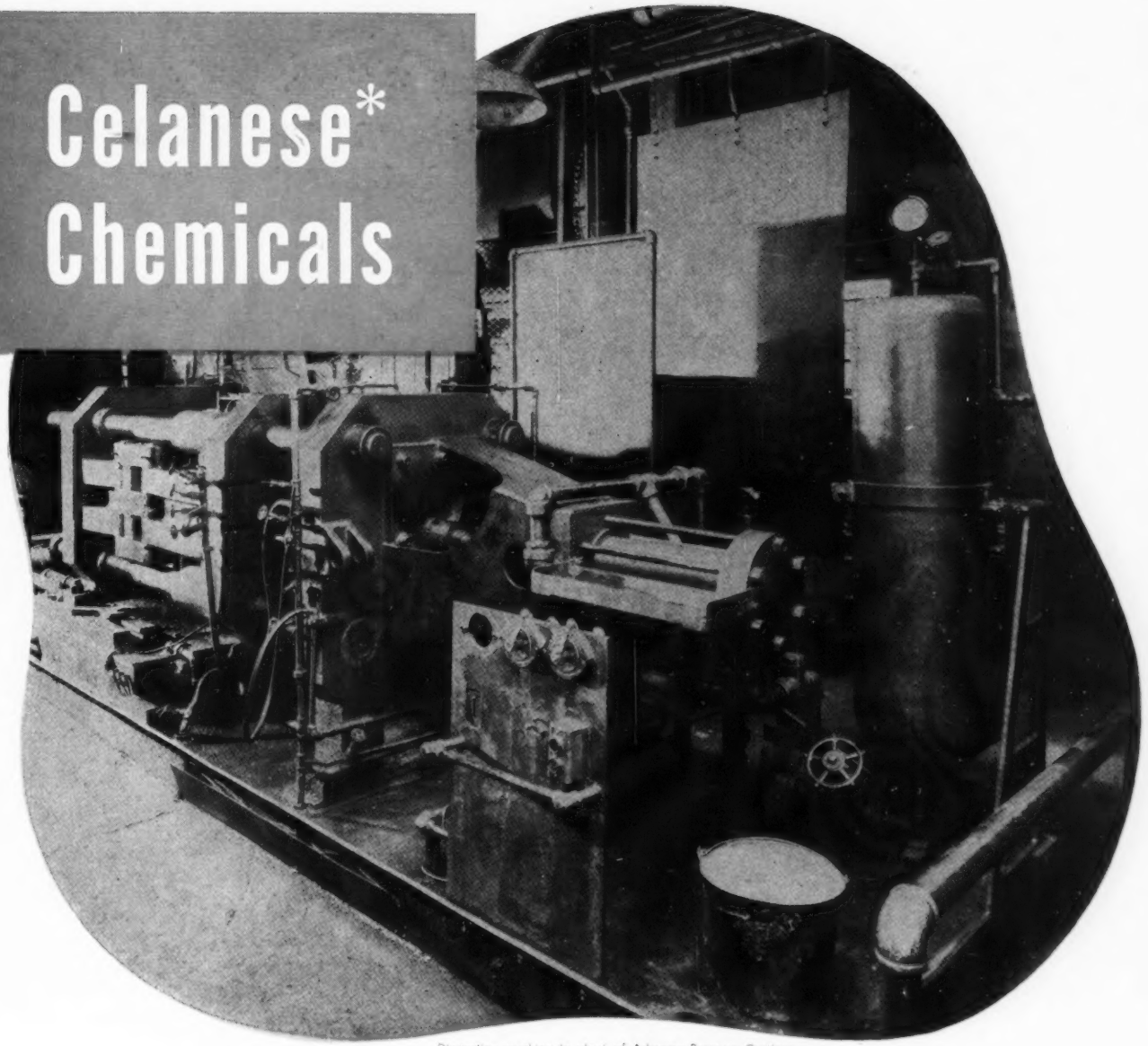
Available in commercial quantities
Liquid

For additional information please write B. F. Goodrich Chemical Company, Department CD-3, Rose Building, Cleveland 15, Ohio.

B. F. Goodrich Chemical Company

A DIVISION OF THE B F GOODRICH COMPANY

Celanese* Chemicals



Diecasting machine in plant of Advance Pressure Castings, Inc., Brooklyn. The non-flammability of Celanese hydraulic fluids eliminates the fire hazard due to line breaks.

LINDOL* · CELLULUBE* · SAFE HYDRAULIC FLUIDS

Engineers are finding extensive use for the Celanese organic phosphates, Lindol and Cellulube, as hydraulic fluids—particularly in applications where the flammability of mineral oil threatens worker's safety and production. In diecasting, for example, the non-flammability of these compounds virtually eliminates the fires due to line breaks and other causes.

Lindol and Cellulube in addition to their non-flammability are non-oxidizing, non-volatile and exceptionally stable.

The industrial development of the organic phosphates has been the subject of many years research at Celanese. From limited usefulness these hydrocarbon compounds have been elaborated and refined to a point where they serve a broad range of industrial purposes. Celanese Chemical Corporation, a division of Celanese Corporation of America, 180 Madison Ave., New York 16, N. Y.

Celanese Corporation of America · Textiles · Plastics · Chemicals

*Reg. U. S. Pat. Off.

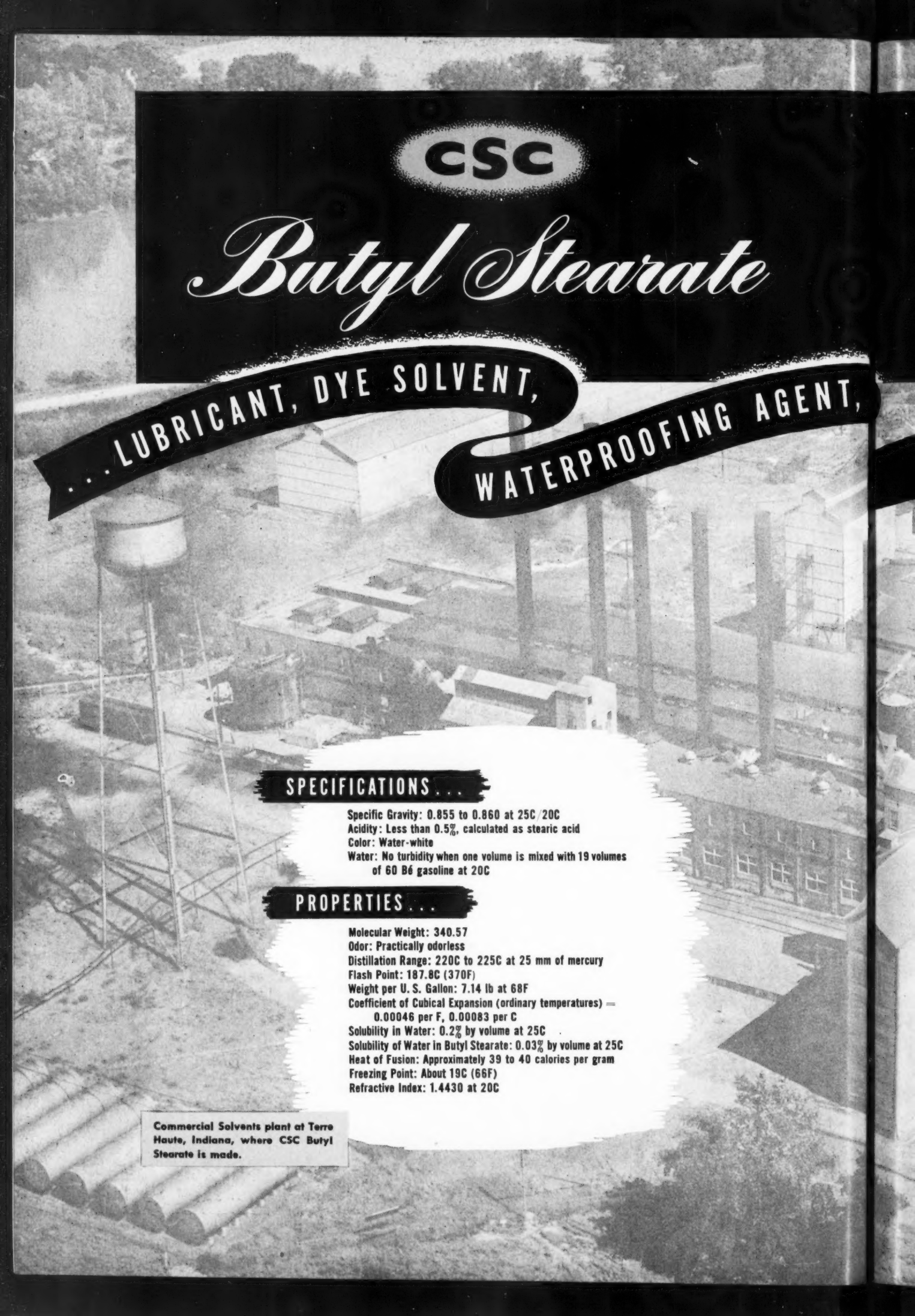
PLASTICIZERS

ORGANIC PHOSPHATES

LUBRICANT ADDITIVES

INTERMEDIATES

DYESTUFFS



CSC Butyl Stearate

. . . LUBRICANT, DYE SOLVENT, WATERPROOFING AGENT,

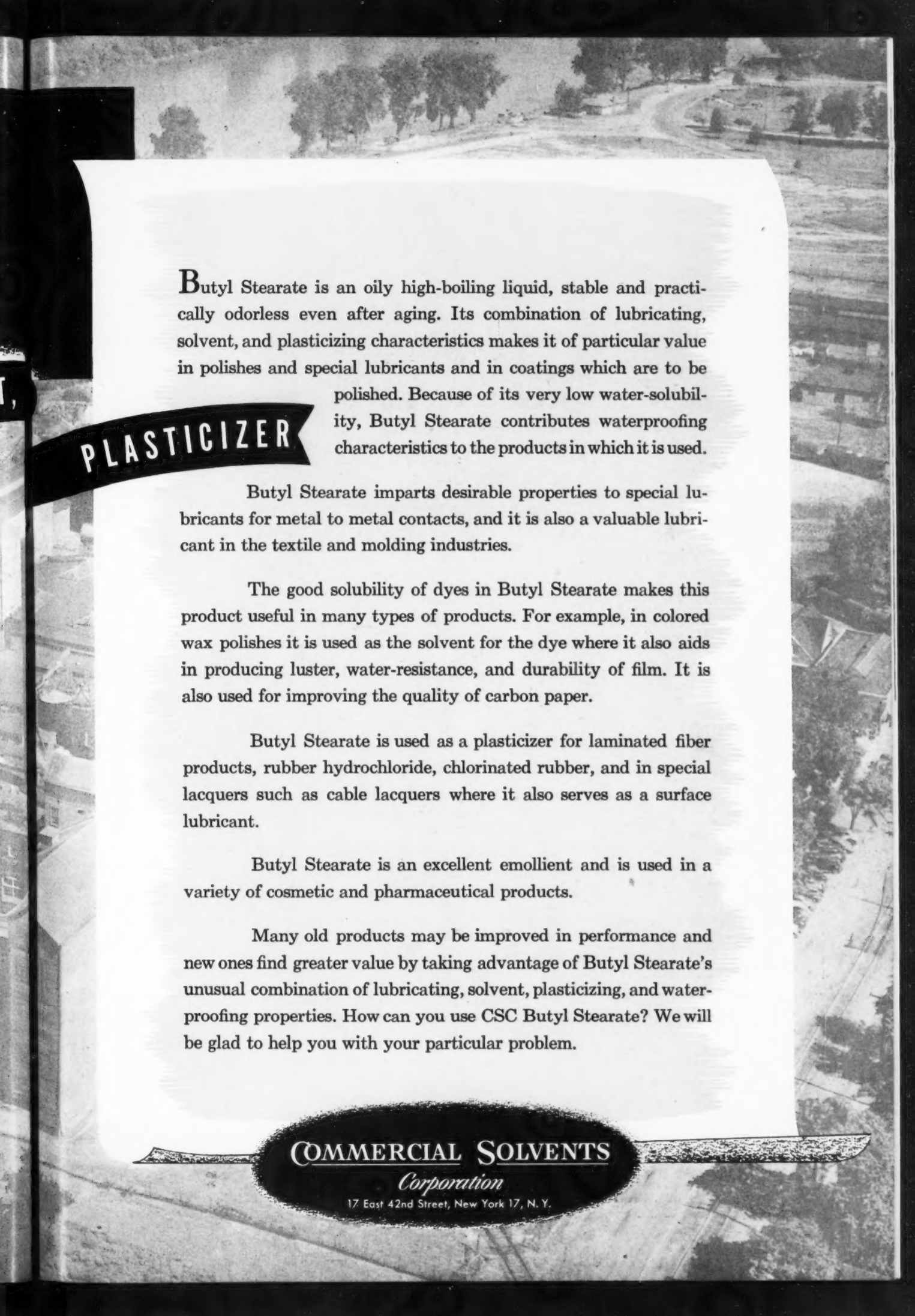
SPECIFICATIONS . . .

Specific Gravity: 0.855 to 0.860 at 25C/20C
Acidity: Less than 0.5%, calculated as stearic acid
Color: Water-white
Water: No turbidity when one volume is mixed with 19 volumes of 60 Bé gasoline at 20C

PROPERTIES . . .

Molecular Weight: 340.57
Odor: Practically odorless
Distillation Range: 220C to 225C at 25 mm of mercury
Flash Point: 187.8C (370F)
Weight per U. S. Gallon: 7.14 lb at 68F
Coefficient of Cubical Expansion (ordinary temperatures) = 0.00046 per F, 0.00083 per C
Solubility in Water: 0.2% by volume at 25C
Solubility of Water in Butyl Stearate: 0.03% by volume at 25C
Heat of Fusion: Approximately 39 to 40 calories per gram
Freezing Point: About 19C (66F)
Refractive Index: 1.4430 at 20C

Commercial Solvents plant at Terre Haute, Indiana, where CSC Butyl Stearate is made.



PLASTICIZER

Butyl Stearate is an oily high-boiling liquid, stable and practically odorless even after aging. Its combination of lubricating, solvent, and plasticizing characteristics makes it of particular value in polishes and special lubricants and in coatings which are to be polished. Because of its very low water-solubility, Butyl Stearate contributes waterproofing characteristics to the products in which it is used.

Butyl Stearate imparts desirable properties to special lubricants for metal to metal contacts, and it is also a valuable lubricant in the textile and molding industries.

The good solubility of dyes in Butyl Stearate makes this product useful in many types of products. For example, in colored wax polishes it is used as the solvent for the dye where it also aids in producing luster, water-resistance, and durability of film. It is also used for improving the quality of carbon paper.

Butyl Stearate is used as a plasticizer for laminated fiber products, rubber hydrochloride, chlorinated rubber, and in special lacquers such as cable lacquers where it also serves as a surface lubricant.

Butyl Stearate is an excellent emollient and is used in a variety of cosmetic and pharmaceutical products.

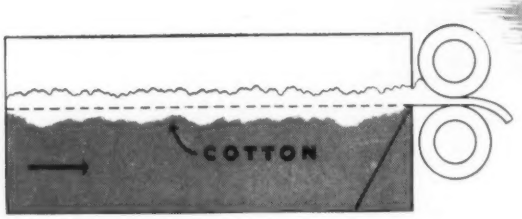
Many old products may be improved in performance and new ones find greater value by taking advantage of Butyl Stearate's unusual combination of lubricating, solvent, plasticizing, and waterproofing properties. How can you use CSC Butyl Stearate? We will be glad to help you with your particular problem.

COMMERCIAL SOLVENTS
Corporation
17 East 42nd Street, New York 17, N. Y.

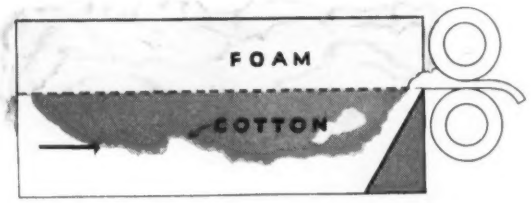
ONE OF A SERIES OF PRODUCT PROBLEMS . . . SOLVED WITH A PHOSPHATE

FIREPROOFING RAW COTTON

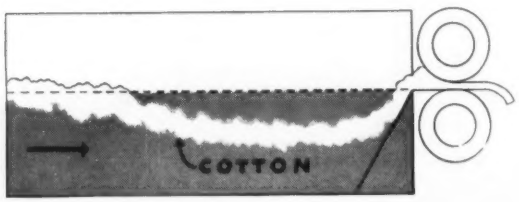
A problem of controlled penetration in a continuous process . . .



Without an efficient wetting agent cotton floats on surface all the way to the squeeze rolls. Uniform and effective penetration of fireproofing salts is impossible.



Uncontrolled penetration . . . usually accompanied by wasteful foaming . . . may cause cotton to sink to bottom of tank thereby impeding processing.



Controlled penetration with Victawet 35B produces practically no foaming. Cotton sinks just below surface . . . machine operates at maximum efficiency . . . rejects are eliminated.

Solved with

VICTAWET 35B

Problem—Because raw cotton is hard to wet, surface-active agents or penetrants which work effectively in the presence of fireproofing salts are required. During the war several plants experimented with various penetrants for this type of work. Some proved unsatisfactory because of excessive foam which wasted solution and made working conditions difficult. Others failed to control speed of penetration resulting in imperfectly fireproofed cotton and subsequent rejections.

Solution—Use of Victawet 35B was recommended by Victor's Research Laboratory. In practical tests, proper concentrations of this new Victor surface active agent provided efficient wetting with practically no foaming. Penetration was controlled so that the cotton sank just below the solution surface without collecting at the bottom of the tank. Speed of processing was stepped up as much as 25%. Production was perfect, and uniform results were demonstrated by flame tests on the finished goods.

Many other penetration problems have been solved with Victor surface-active agents. If you have a problem, think first of a phosphate from Victor.

GOT A PROBLEM? THINK FIRST OF A phosphate from VICTOR

VICTOR CHEMICAL WORKS

VICTOR CHEMICAL WORKS

Headquarters for Phosphates • Formates • Oxalates

141 West Jackson Boulevard, Chicago 4, Ill.

NEVILLE

Nevillac OA Plasticizer

Specifications and Properties

Sp. Gr. @ 30° 15.6°C.	0.980 to 1.00
Viscosity (Gardner-Holdt)	W (average) @ 25°C
Distillation by volume	Essentially between 300°C and 375°C
Max. % off @ 300°C.	5%
Refractive Index @ 20°C.	1.5355
Molecular Weight	230
Odor	Sweet, Characteristic
Color	Amber
Color Retention	Good

Fields of Use

Adhesives of the waterproof, optical, shoe, packaging and pressure sensitive types;

Paper coatings both waterproof and greaseproof and for ordnance wrap;

Paints and varnishes including laminating varnishes, printing and duplicating inks;

Artificial leather and leather finishes;

Raincoats;

As a plasticizer for ethyl cellulose in lacquers, plastics and stripping compounds.

THIS new plasticizer is an alkylated phenol and has a wide range of solubilities and compatibilities. It is soluble in almost all liquids except water and glycerol. It is compatible with most synthetic resins including cellulose esters and ethers (nitrocellulose, ethylcellulose, cellulose acetate, etc.), vinyl acetate, vinyl butyral, zein, nylon, and partly compatible with vinyl acetate and chloride copolymer.

Being an alkylated phenol, Nevillac OA undergoes typical reactions. For instance, with formaldehyde, oil-soluble phenolic resins are produced which can be formulated as such in varnishes, or can be used in fortifying rosin, rosin esters, alkyd resins and established types of phenolic resins.

Write for gratis sample and further information on Nevillac OA for your particular application.

THE NEVILLE COMPANY

PITTSBURGH, 25, PA.

Chemicals for the Nation's Vital Industries

BENZOL · TOLUOL · XYLOL · TOLLAC · NEVSOL · CRUDE COAL TAR SOLVENTS
HI-FLASH SOLVENTS · COUMARONE INDENE RESINS · PHENOTHIAZINE · TAR PAINTS
RUBBER COMPOUNDING MATERIALS · WIRE ENAMEL THINNERS · DIBUTYL PHTHALATE
RECLAIMING, PLASTICIZING, NEUTRAL CREOSOTE, AND SHINGLE STAIN OILS

A-21

AN ESSENTIAL PRODUCER OF MAJOR VITAMINS

C

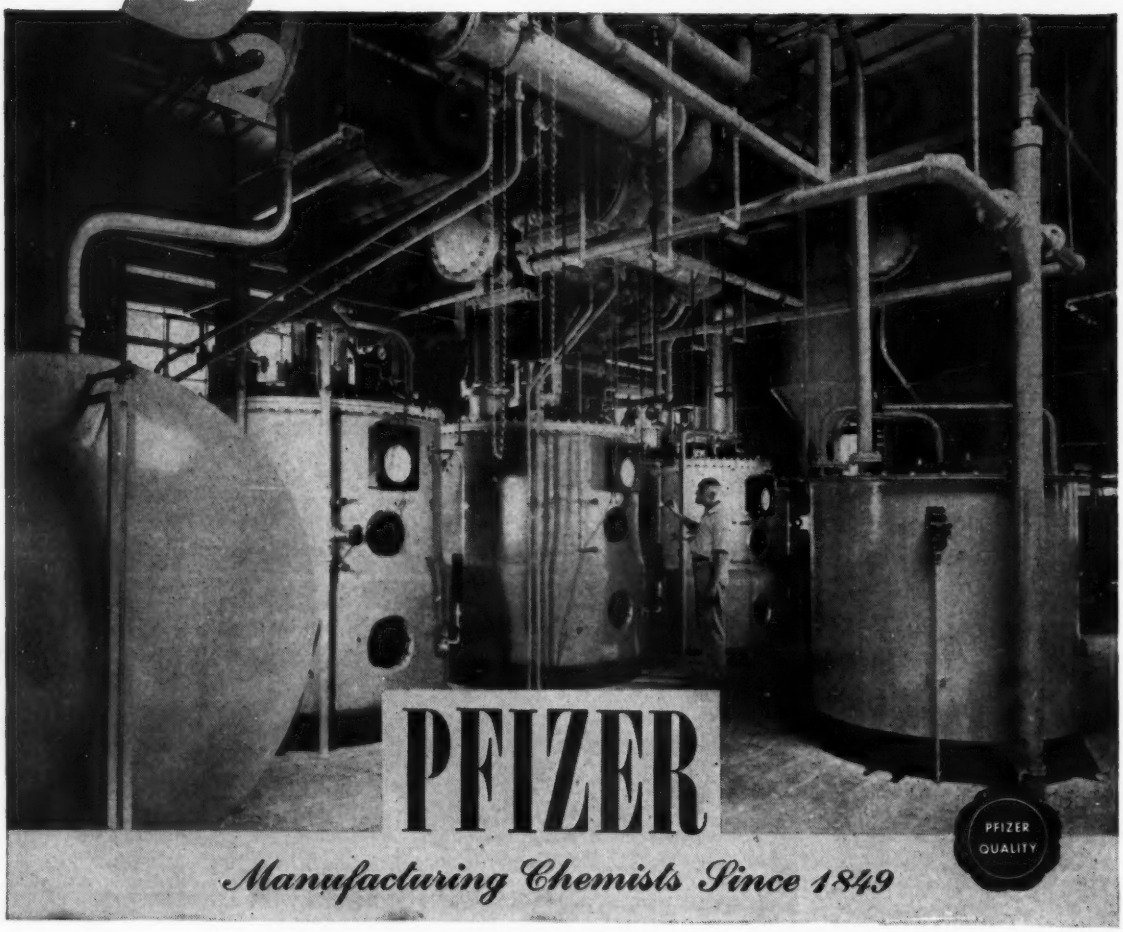
B_1

B_2

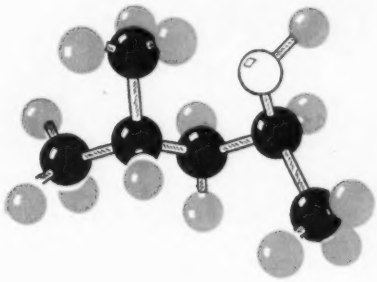
From a welter of conflicting claims and special pleadings, certain facts about vitamins have emerged. On several of these facts there is almost universal agreement today. No medical authority, for example, disputes the therapeutic functions performed by Vitimin B_1 in the treatment of beriberi . . . by Vitamin C in the prevention of scurvy. And few scientists question the proved effectiveness of vitamins in the enrichment of processed foodstuffs.

It is in just these "areas of agreement" that Chas. Pfizer & Co. has become a leading producer of major vitamins . . . has been meeting a demand for ever-growing quantities of ascorbic acid, riboflavin, thiamine, niacin and niacinamide . . . has been advancing the ethical use of vitamins in overcoming diet deficiencies.

Vigilance in maintaining high standards of quality is a Pfizer "basic". It has been a fundamental part of Pfizer policy during a near-century of experience . . . years in which the importance of the manufacturing chemist has become more and more widely recognized. Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y. and 444 West Grand Ave., Chicago 10, Ill.



Shell Chemical Announces commercial production of a hexyl alcohol



METHYL ISOBUTYL CARBINOL

(Methyl Amyl Alcohol)

MIBC IS USEFUL AS:

Medium-Boiling Latent Solvent in nitrocellulose lacquers — contributes good blush resistance, gloss, flow, and leveling in cold spray, brushing, and hot spray lacquers. Allows use of larger quantities of low-boiling alcohols in lacquer or lacquer thinner formulas, while retaining good blush resistance.

Medium-Boiling Nitrocellulose Lacquer Solvent (in combination with methyl isobutyl ketone)—gives high toluene dilution ratio . . . excellent blush resistance . . . low viscosity especially valuable in high solids lacquer formulations.

Resin Solvent for phenolic type baking finishes—low water solubility of MIBC lessens dehydration of gelatin rolls used in roller coating application.

Alcohol Portion of a Solvent for synthetic alkyd and urea-formaldehyde baking finishes—small portions in conjunction with aromatic petroleum diluents yield solutions of low viscosity. Low evaporation rate of MIBC tends to eliminate bubbling during baking of finishes.

Frother (with other materials) in flotation recovery of certain copper ores.

Methyl Isobutyl Carbinol is available in compartment or straight tank car shipments

For more detailed information on the applications, properties, and specifications, write for Technical Bulletin #SCC: 46-1

SHELL CHEMICAL CORPORATION

100 BUSH STREET, SAN FRANCISCO 6
500 FIFTH AVENUE, NEW YORK 18

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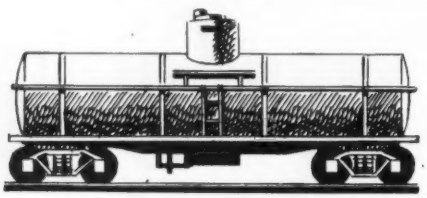
SHIPPED

WHERE and HOW

YOU WANT IT



TANK CAR
CARBOYS
BARRELS

Carloads or less carload lots

V-C 75% Phosphoric Acid

An acid of high purity and wide utility

We are constantly improving our production facilities in our effort to meet the increasing demands of industry for V-C Phosphoric Acid. Whether you need a carboy or a tank car, your inquiry will receive our full attention.

V-C H_3PO_4 85% U.S.P. Syrupy
V-C H_3PO_4 85% Technical Grade
V-C H_3PO_4 75% Food Grade

VIRGINIA-CAROLINA CHEMICAL CORPORATION

RICHMOND 5, VIRGINIA

VC CHEMICALS

HAND IN HAND WITH INDUSTRY

You can KETTLE-FINISH *Lithium Greases*

Since our development of Litholite (Foote Lithium Stearate) for the preparation of all-weather greases, we have often been asked whether lithium greases could be kettle-finished. As the result of further research in our laboratories and afield, we are now able to answer this question affirmatively.

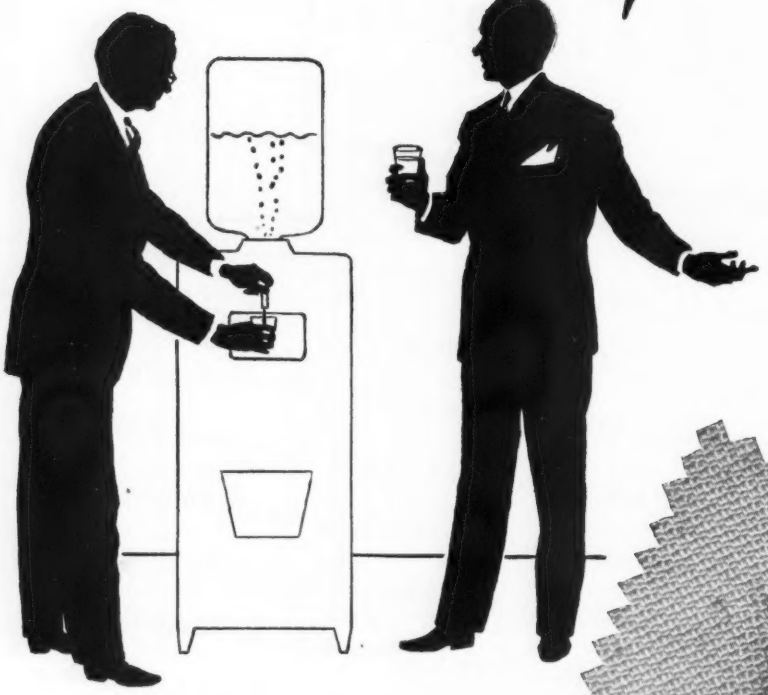
If you are interested in kettle-finishing lithium greases, you are invited to write us today for details and advantages. Foote Mineral Company, 501 Germantown Trust Company Building, Philadelphia 44, Pa.

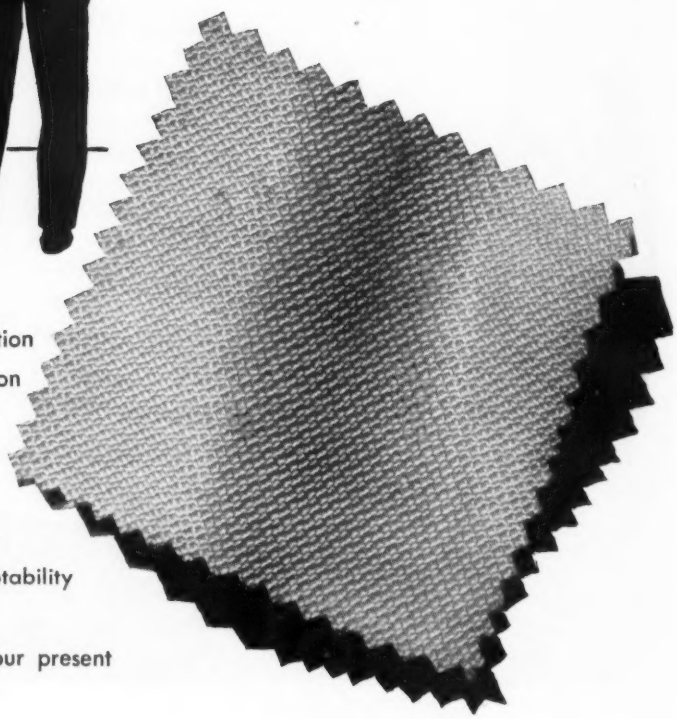
Foote
MINERAL COMPANY
A Step Ahead in Industrial Ores and Chemicals

Chemicals • Ores • Metals • Alloys

PHILADELPHIA • ASBESTOS • EXTON, PENNSYLVANIA
Home Office: 501 GERMANTOWN TRUST COMPANY BLDG., PHILA. 44, PA.
West Coast Representative: Griffin Chemical Co., San Francisco, Cal.

. . . Then we tried "Vinyon"* Fiber Filter Fabrics in all cases where corrosive fluids were giving us trouble





New products and processes involving the filtration of corrosive fluids call for special attention in the selection of filter material that is *just right* for the job. "Vinyon" fiber filter fabrics have proven their superiority in many situations. Made in a wide variety of constructions "Vinyon" fabrics assure users of longer filter life, higher efficiency and ultimate economy. Look into "Vinyon's" adaptability to *your* filtering operations.

When writing please include all information regarding your present filtration process.

*Reg. Trade Mark C & C. C. C.

WELLINGTON SEARS COMPANY

SALES AGENTS

65 WORTH STREET • NEW YORK 13, N. Y.

As Intermediates or End Products, Hooker Benzoates have the Purity You Want

Whether you are interested in benzoates as intermediates for the preparation of other compounds or in their use as end products, you need chemicals of high purity. Because of their consistently high quality, their freedom from impurities, Hooker Benzoates are first choice among careful buyers. These Hooker products have found use in widely varied fields—as preservatives for foods, cosmetics, and rubber—as intermediates in the manufacture of dyestuffs and medicinals—as ingredients of soaps and perfumes.

In whatever chemical field you are working, you may find a profitable use for one or more of the Hooker Benzoates whose properties are listed below. More complete information on the benzoates as intermediates and preservatives is available in bulletin form. Individual Technical Data Sheets on these important Hooker Chemicals will be sent to those making requests on their business letterheads. Our Technical Staff may also be able to work with you on the application of Hooker Benzoates or the other Hooker Chemicals to your particular needs.

HOOKER RESEARCH *Presents*

BENZOTRIFLUORIDE

$C_6H_5CF_3$

Molecular Weight	146.1
Freezing Range	−28.5° to −29.5°C
Boiling Range (ASTM, 98%)	2.5° including 101°C
Refractive Index, n20/D	1.4145±.0005
Specific Gravity, 15.5°/15.5°C	1.197±.001

A study of possible applications indicates that Benzotrifluoride may be of value in several industrial fields: Dyestuffs, dielectrics, medicinals, insecticides or chemical synthesis.

Hooker Benzotrifluoride is a water white liquid with aromatic odor, completely miscible with most common solvents. Thermal stability is excellent and under nitration or chlorination the CF_3 group is strongly meta directing.

Benzotrifluoride is already available in pilot plant quantities. A request on your business letterhead will bring a research sample and technical Data Sheet No. 350, describing physical and chemical properties more completely.

PRODUCT *Chemical Formula* *Molecular Weight*	DESCRIPTION & USES
Ammonium Benzoate, Tech. $C_6H_5COONH_4$; 139.1	White crystalline solid. Preservative for latex and adhesives; manufacture medicinals.
Benzoate of Soda, U.S.P., Tech. C_6H_5COONa; 144.0	White, odorless crystalline solid. Purity 99% min. Preservative for tomatoes, catsup, margarine, fruit juices, pharmaceuticals, tooth paste and powder; curing tobacco.
Benzoic Acid, U.S.P., Tech. C_6H_5COOH 122.1	White odorless, crystalline solid. Purity 99.3% min. Manufacture of dyestuffs, perfumes and pharmaceuticals, ingredient of cosmetics, pharmaceutical preparations, antiseptics, dentifrices; preservation of food; curing of tobacco.

PRODUCT *Chemical Formula* *Molecular Weight*	DESCRIPTION & USES
Metanitrobenzoyl Chloride $NO_2C_6H_4COCl$; 185.5	Yellow to brown liquid, partially crystallized. L. C. P. 28° to 31°C. Manufacture dyes for fabrics; color photography; pharmaceuticals.
Methyl Benzoate $C_6H_5COOCH_3$; 136.1	Clear, colorless liquid. Sp. Gr. 1.0930. B. R. 2° including 199°C. Ingredient of perfumes, soaps and medicines; preservative for rubber.
Paranitrobenzoyl Chloride $NO_2C_6H_4COCl$	Yellow crystalline material in lump form. Decomposes in water and alcohol; soluble in ether; M. P. 70°C min; purity 95% min. Manufacture of Novocaine and dyes.

ARMY E NAVY

HOOKER ELECTROCHEMICAL COMPANY

3 Forty-Seventh St., Niagara Falls, N. Y.

New York, N. Y. • Wilmington, Calif. • Tacoma, Wash.

HOOKER CHEMICALS

Caustic Soda	Muriatic Acid	Sodium Sulfide
Paradichlorbenzene	Chlorine	Sodium Sulfhydrate

8353

CHEMICAL STONEWARE

its place in the unit processes

1.—FLUID HANDLING

General Ceramics ACID ELEVATORS For Handling Corrosive Liquids

When working out a flow sheet for a new process one of the most important considerations is the choice of apparatus for the handling of corrosive liquids.

One of the simplest devices for this purpose is the Acid Elevator, or Acid Egg. Chemical stoneware is an ideal material of construction for this equipment as it is not only corrosion resistant but corrosion proof against all acids, with the exception of hydrofluoric.

General Ceramics chemical stoneware acid elevators are made in two styles, manually operated and automatic, and in capacities ranging from 15 to 200 gallons. The manually operated acid egg is suitable for batch operations and the automatic acid elevator is used where continuous operation is required. Both types have the inherent characteristics of simplicity of operation, comparatively low first cost, ease of maintenance, and low air consumption.

If you are having difficulty with an acid handling problem SEND FOR BULLETIN 201 which describes in detail the construction, installation, and operation of this equipment.

General Ceramics engineers, experienced in all phases of the handling of corrosive liquids, will be glad to cooperate on the design and selection of this apparatus. Write to our main office or to one of our branch offices for complete information on this subject and for BULLETIN 201.

1135

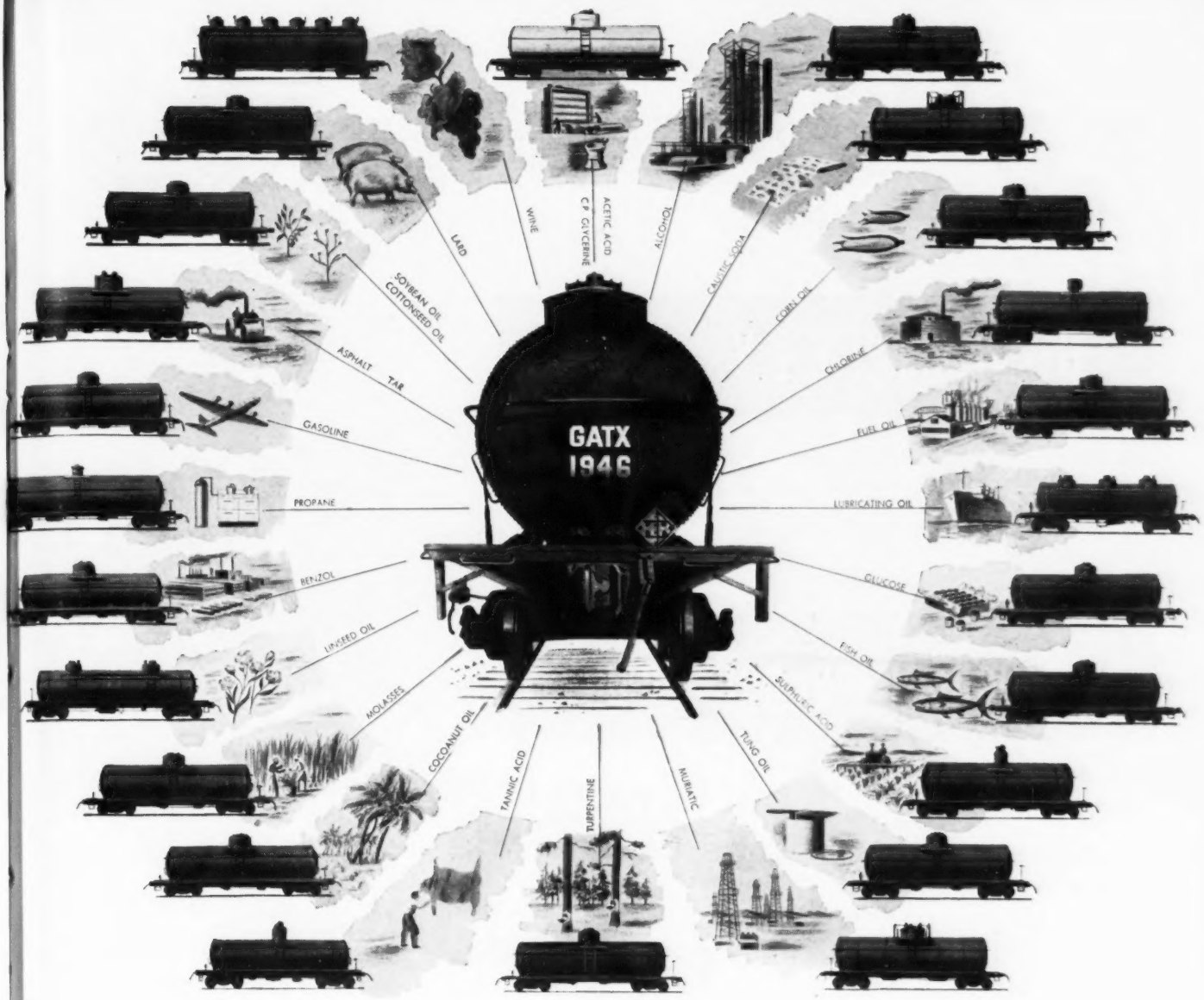
GENERAL CERAMICS AND STEATITE CORPORATION
CHEMICAL EQUIPMENT

BUFFALO: 610 Jackson Bldg. CHICAGO: 20 N. Wacker Drive
LOS ANGELES: 415 So. Central Ave. PORTLAND 5, ORE.: 410 New Fliedner Bldg.
NEW YORK: 30 Broad Street • SEATTLE: 1411 Fourth Ave. • SAN FRANCISCO: 598 Monadnock Bldg.
TACOMA: 417 Tacoma Bldg. • HOUSTON: 2015 Second National Bank Bldg.
MONTREAL: Canada Cement Bldg. • TORONTO: Richardson Agencies, Ltd., 454 King St., West
VANCOUVER, B.C.: Willard Equipment Ltd., 860 Beach Ave.

General Ceramics AND STEATITE CORP.

CHEMICAL EQUIPMENT DIVISION
KEASBEY, NEW JERSEY

In addition to the manufacturing facilities of the Chemical Equipment Division those of the Insulator Division are also available for handling ceramic problems in all branches of industry. General Ceramics & Steatite Corporation is therefore able to offer service covering all industrial applications of ceramic products.



FOR RENT

37,000 Specialized Tank Cars—207 Types—For Swift, Sure, Economical Transportation of Liquids in Bulk

•

GATX tank cars—207 types from 4,000 to 12,500 gallon capacities—haul an almost infinite variety of liquids: from propane to port wine to pine tar.

•

Strategically located offices, plants and repair shops throughout the nation give General American the unique ability to provide shippers precisely the kind of tank cars they want, *when* they want them, *where* they want them.

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These tank cars are for rent. So, if the cargo is bulk liquid and the problem safe, fast, economical transportation—count on General American.

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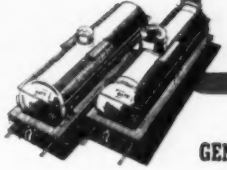
Take your tank car problems to our nearest office



GENERAL AMERICAN TRANSPORTATION CORPORATION

CHICAGO

GENERAL AMERICAN TRANSPORTATION CORPORATION

General Offices: 135 S. La Salle Street, Chicago 3, Ill.

DISTRICT OFFICES

New York	Los Angeles	New Orleans
St. Louis	Dallas	Tulsa
Buffalo	Houston	Cleveland
Seattle		Pittsburgh

WORLD'S LARGEST PRODUCER OF SYNTHETIC RESINS

RCI

GENUINELY NEW

COSTS LESS!
COOKS FASTER!

In Composition and Results

YIELDS HIGHER VISCOSITY!
DRIES QUICKER!

NO. 2100 SUPER-BECKACITE

Not merely an improved product but an entirely new resin—that's No. 2100 Super-Beckacite, a truly high-light achievement in the development of surface coating resins. It's better in nearly every way than any previous resin—better in film and performance properties . . . better in physical characteristics . . . better for economy! From now on this pure phenolic is the No. 1 choice for high grade enamels and spar varnishes. Write to the Sales Department for further data on the most important advancement in a pure phenolic resin since RCI products first changed the industry.

REICHHOLD CHEMICALS, INC.

General Offices and Main Plant, Detroit 20, Michigan

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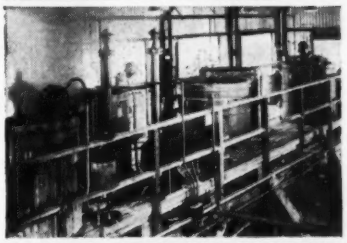
SYNTHETIC RESINS • CHEMICAL COLORS • PHENOLIC PLASTICS • INDUSTRIAL CHEMICALS

Why you should come to

CHEMICO
CHEMICAL CONSTRUCTION CORP.

1

2 

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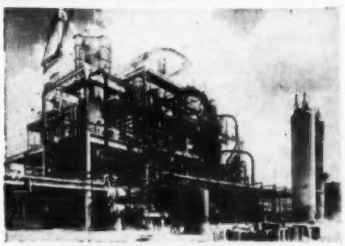
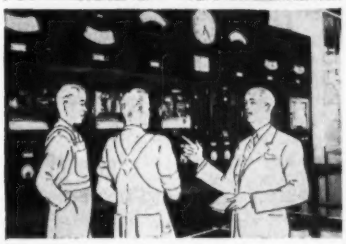
4 

5 

6

...for acid plants

For more than 30 years, the CHEMICO organization has specialized in the design of plants for the production, recovery and concentration of sulphuric and other acids.

To CHEMICO and its customers, "engineering" means far more than plant layouts. It includes all the six elements of CHEMICO service listed below. It further includes constant research towards improvements in techniques and processes, conducted by acknowledged authorities and backed by unequalled resources.

More than 600 CHEMICO installations prove why you are sure of successful results when you come to CHEMICO for acid plants. Your inquiry is invited without obligation.

CHEMICO SERVICE includes

1. ***Analysis of individual plant conditions***
2. ***Selection of processes***
3. ***Layout and design of plant***
4. ***Erection of plants***
5. ***Training and initial supervision of crew***
6. ***Guarantee of results***

CHEMICAL CONSTRUCTION CORP.

EMPIRE STATE BLDG., 350 FIFTH AVE., NEW YORK 1, N. Y.

European Repr.: Cyanamid Products, Ltd., Berkhamsted, Herts., England. • Cables: Chemiconst, New York

CC-101

CHEMICO PLANTS are PROFITABLE INVESTMENTS

HERE ARE THE BASIC MATERIALS YOU NEED...NOW!

GOVERNMENT-OWNED WAR SURPLUS

Chemicals

SPECIAL
NAPALM THICKENER

Mixture of Oleic, Napthenic, and Cocoanut Fatty Acids, representing a metallic soap compound. 971,850 lbs., Denver, Colorado. 216,200 lbs., Birmingham, Alabama. Packed in drums, price $.10 per lb. in carload lots and $.12 per lb. l.c.l.

One of the most important of the Surplus Disposal jobs assigned to the War Assets Corporation, a subsidiary of RFC, is the selling . . . *now* . . . of a large and varied stock of Surplus Chemicals. These chemicals represent a tremendous Government investment, but *they are priced for quick sale and represent real values to industrial users!*

Because of space limitations, only a few of the major items are offered in this advertisement. If you are interested in any of the items offered here, write, wire or telephone the RFC Agency Office listed below, where the stock is located. Act quickly! All items offered are F. O. B. Location. Credit terms may be arranged.

VETERANS: To help you exercise your priority, special veteran service facilities are now available at our offices.

CHECK THIS LIST FOR YOUR NEEDS

and have your name placed on our regular mailing list by mailing the attached coupon.

CHECK AND MAIL TODAY!

To War Assets Corporation:

Please send me further information on the following products:

- ☐ Glacial Acetic Acid, CP, 10,067 gallons in one-gallon bottles, San Francisco, Calif., price $1.00 per gal.
- ☐ Glacial Acetic Acid, CP, 1,416 gallons in one-gallon bottles, Portland, Oregon, price $1.00 per gal.
- ☐ Bakelite Rods and Sheets, Large Quantities, Various Sizes and Dimensions, Phila., Pa.
- ☐ Copper Napthenate, 28,212 lbs., 8% solution, in drums, Cleveland, Ohio, price $.12 per lb.
- ☐ Copper Napthenate, 22,220 lbs., 8% solution, in drums, Nashville, Tennessee, price $.12 per lb.
- ☐ Copper Napthenate, 10,037 lbs., 8% solution, metal drums, Charlotte, N. Carolina, price $.12 per lb.
- ☐ Copper Napthenate, 6,613 lbs., 8% solution, in drums, Birmingham, Ala., price $.12 per lb.
- ☐ Sodium Sulphite, 492,000 lbs., 100-lb. bags, Nashville, Tenn., price $30.00 per ton.
- ☐ Manganous Chloride, 100 short tons, in bulk, Salt Lake City, Utah, price $50.00 per ton.

Firm .....

Street .....

City ..... State .....

(155-1)

Contact your nearest RFC Agency Office listed below for information, regarding *all* surplus materials. If your local RFC office does not have all the materials you need, it will endeavor to locate them from other offices throughout the country.

PAINTS

PROTEIN BINDER COLD WATER CAMOUFLAGE PAINT, TYPE I
Specification: ES-T-1093
Colors: Burnt Sienna, Burnt Umber, Deep Green, Blue, Chrome Oxide Green, Iron Oxide Red, Earth Red
Packed in 5 pound cartons
Richmond, Virginia
Price: 2¢ per pound

OLEORESINOUS (EMULSIFIABLE) CAMOUFLAGE PAINT
Specification: T-1279
Color: Olive Drab
Packed in 5 gallon containers
San Francisco, California
Price: 65¢ per gallon
Minimum sale: 200 gallons

OIL TYPE READY MIXED CAMOUFLAGE PAINT
Specification: T-1215
Colors: Olive Drab, Loam, Earth Brown, Field Drab, Earth Red, Dark Green
Packed mostly in 5 gallon containers
San Francisco, California
Price: 65¢ per gallon
Minimum sale: 200 gallons of any one color

CAMOUFLAGE LACQUER
Specification: M-485 & M-485 C. Colors: Light Gray & Blue Gray
Packed in 5 gallon containers
Philadelphia, Penna.
Price: 50¢ per gallon

LACQUER DOPE
Specification: 3-109-E
Color: Olive Drab
Packed in 30 gallon drums
Chicago, Illinois
Price: 50¢ per gallon

A DISPOSAL AGENCY DESIGNATED BY THE SURPLUS PROPERTY ADMINISTRATION for Surplus Producers' and Capital Goods, Aircraft and Plants formerly handled by Reconstruction Finance Corporation . . . and for Surplus Consumer Goods formerly handled by United States Department of Commerce.

WAR ASSETS CORPORATION

(A SUBSIDIARY OF RECONSTRUCTION FINANCE CORPORATION)

RFC OFFICES (INCLUDING FORMER DEPARTMENT OF COMMERCE REGIONAL SURPLUS PROPERTY OFFICES) LOCATED AT: Atlanta • Boston • Chicago • Denver • Kansas City, Mo. • New York • Philadelphia • San Francisco • Seattle • OTHER RFC SURPLUS PROPERTY OFFICES LOCATED AT: Birmingham • Charlotte • Cleveland • Dallas • Detroit • Helena • Houston • Jacksonville • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • Oklahoma City • Omaha • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • Spokane • OTHER FORMER DEPARTMENT OF COMMERCE REGIONAL SURPLUS PROPERTY OFFICES LOCATED AT: Cincinnati and Fort Worth

industry needed it*...

B&A met the demand

POTASSIUM NITRITE KNO_2

Commercially Available in Tonnage Quantities

*** THE STORY BEHIND POTASSIUM NITRITE**

The war was at its peak; the need, urgent. Key production hinged on having the laboratory chemical, Potassium Nitrite, in tonnage lots.

"It has never been made commercially. Can Baker & Adamson do it?" the customer asked. *B&A* accepted the challenge, placing the problem in the hands of its research and production experts. *The result:* For nearly a year *B&A* has been in full production on this new industrial chemical, meeting the customers' schedules, ton after ton, without fail!

Another example of B&A's ability to produce "custom made" chemicals on order for industry. Another example of the organization and facilities at your disposal when you bring your "special chemical" requirements to Baker & Adamson.

NOW Baker & Adamson brings Potassium Nitrite to American Industry in *commercial* quantities . . . once again meeting the demand to produce laboratory chemicals in tonnage lots!

Today for the first time this salt, with its invaluable properties as a heat-transfer medium, becomes available for large-scale industrial use . . . opening the way to a score of potential applications.

The special characteristics of this new *B&A* industrial chemical may provide the answer to your research or production problems. Investigate *now!* Baker & Adamson will be pleased to send you pertinent data and experimental samples—without any obligation—upon request to the nearest Sales & Technical Service Office below.

Setting the Pace in Chemical Purity Since 1882

BAKER & ADAMSON B&A QUALITY STANDARD OF PURITY

Reagent and Fine Chemicals

BAKER & ADAMSON

Division of GENERAL CHEMICAL COMPANY, 40 Rector St., New York 6, N.Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Providence (R. I.) • San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee • Yakima (Wash.)

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One Cylinder Bank Can Guard Several Hazards

A single centrally located bank of Kidde cylinders can, in many instances, be used to protect more than one fire hazard. By means of directional valves, carbon dioxide from the cylinder bank can be discharged into any of the protected areas.

The directional valves may be manually or automatically controlled. A three-quarter turn of the manual valve directs the carbon dioxide to the correct nozzles. In automatic operation, the heat detectors in the threatened space actuate the valves.

Full details may be obtained from Walter Kidde & Company, Inc.

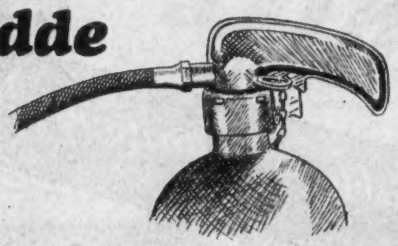
KEEP EXTINGUISHERS IN FIGHTING TRIM

Free Booklet Tells How

For helpful tips on keeping your extinguishers always ready for action, get your free copy of "Inspection & Maintenance of First Aid Fire Extinguishers."

Walter Kidde & Company, Inc.
327 Main Street, Belleville 9, N. J.

Kidde

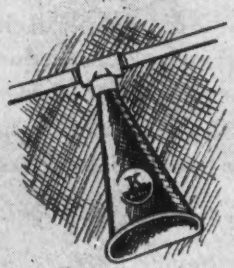


AIM AT THE FIRE . . .
PULL THE TRIGGER

The natural way is the right way to fight fires with the Kidde Model 15 Portable. Single-finger control—safe, simple, foolproof.

Mail and Phone Orders Filled

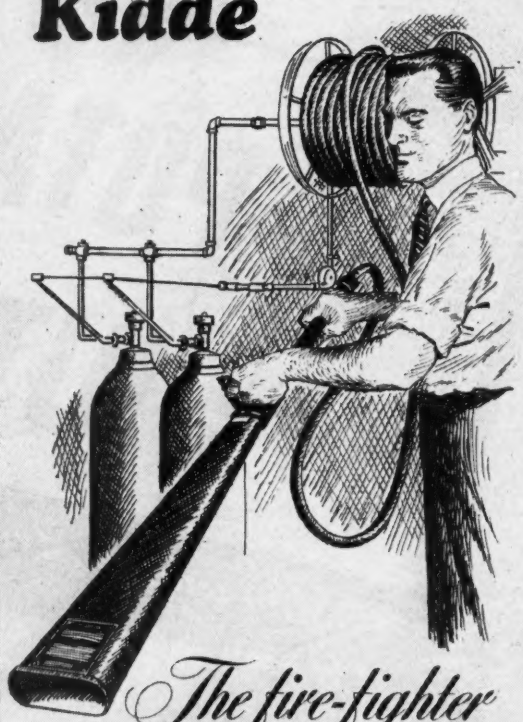
Kidde



PUTS FIRE OUT IN TWENTY SECONDS!

Shielded nozzles supplied with Kidde Total Flooding Systems rapidly fill threatened space—floor to ceiling—with carbon dioxide. Fire is smothered in seconds.

Kidde



The fire-fighter with a 50-foot swing

Kiddie Hose Reels pack a real-fire-killing wallop. Hose length up to 150 feet gives operator plenty of freedom for action in extinguishing flames. New light-weight reel. Supplied with one or more 50-pound cylinders of carbon dioxide.

MAIL AND PHONE ORDERS FILLED

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Walter Kidde & Company, Inc. • 327 Main Street, Belleville 9, New Jersey

GI Students Ask VA

General output at factories and mines decreased 4 per cent in October, while in the first half of November

Home from Manila,

stationed in a little town in France for several months, wooed a French girl by telling her about

DIAMOND SODA ASH

A dependable, active helper

in many manufacturing fields

such as

GLASS

ALUMINUM

EXPLOSIVES

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DIAMOND ALKALI COMPANY

Pittsburgh, Pa. and everywhere

NEW resin...

"HIGH PHTHALIC"

"NO REPORTABLE OIL OR ROSIN"

"VERY REASONABLY PRICED"

...it's U.S.I. Aroplaz 1379

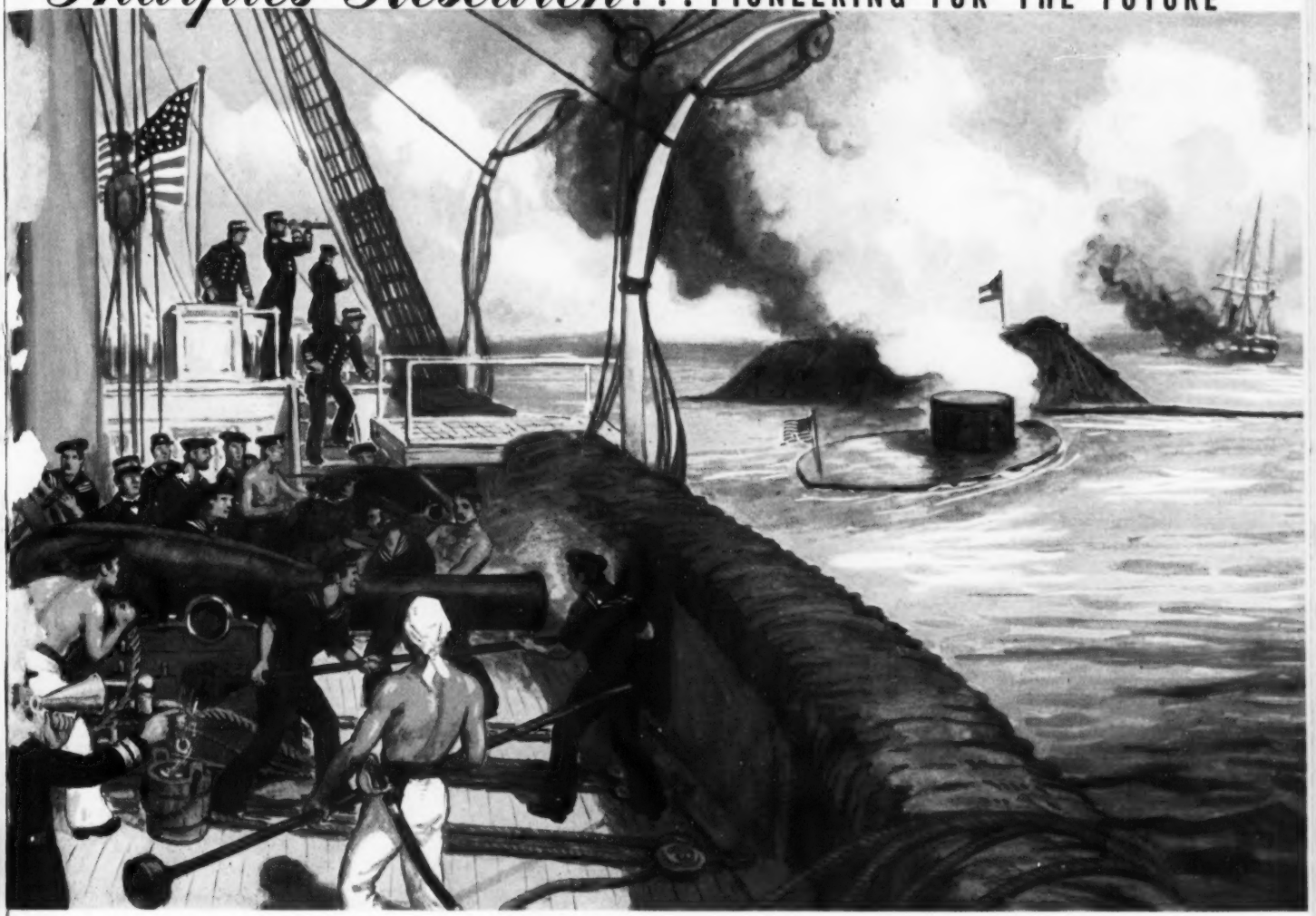
U.S.I. AROPLAZ 1379, a new modified alkyd resin of medium-to-short oil length, is U.S.I.'s answer to your current need for a high-quality, low-cost, non-quota resin. It contains no reportable oil or rosin. Its high phthalic content assures top performance in a wide variety of air-drying and low-temperature baking finishes for such items as metal cabinets, toys, hardware, implements, etc. It also works well in metal primers, low-cost finish coats, and as a general utility vehicle. Aroplaz 1379 is immediately available and is priced at a very attractive level. Your request for samples will receive prompt attention. Phone or write today.

Specifications

Solution:	49-51% solids in mineral spirits
Viscosity (G.H.): . . .	X-Z
Color (G.H. 1933): . . .	10-12
Acid value (solvent free basis) . .	10-16
Wt/gallon @250C.: . .	7.7-7.8 lbs.
Oil Content (solvent free basis) . .	No reportable oil
Phthalic Anhydride (solvent free basis) . .	33%

U.S.I INDUSTRIAL CHEMICALS, INC.
60 East 42nd Street, New York 17, N. Y.

Sharples Research... PIONEERING FOR THE FUTURE



"An indecisive battle between the first iron-clad ships, the U.S.S. *Monitor* and the Confederate ship, *Merrimac*, occurred March 9, 1862. From these forerunners spring the mighty steel warships and ocean liners of today."

TODAY'S chemical enterprises bear little more resemblance to their forerunners than modern ships do to the ones pictured above. Many products now being developed will find important uses in various fields as research continues.

Amines have been known for many years but it is only comparatively recently that many such as ethylamines, butylamines and others have become of great commercial importance. In continuing the development of these versatile nitrogen compounds, Sharples offers for evaluation, experimental quantities of the items described below. These chemicals are colorless liquids, soluble in water and most common solvents. Although specifications have not been established, the tabulated properties indicate the quality expected from larger scale production when conditions permit.

The presence of two functional groups suggests the potential value of these new Sharples amines as intermediates for the synthesis of textile assistants, emulsifying agents, dyestuffs, pharmaceuticals and insecticides. Their characteristics may suggest other applications worth investigating. Samples available upon request.

NEW SHARPLES AMINES

Name	Formula	Molecular Weight (Calcd.)	Boiling Range ° C.	Sp. Gr. at 20/20° C.	Refractive Index at 20° C.	Flash Point ° F.
3-Diethylaminopropylamine	$H_2NCH_2CH_2CH_2N(C_2H_5)_2$	130.2	165-170	0.825	1.443	125
1,3-Diaminobutane	$H_2NCH_2CH_2CH(NH_2)CH_3$	88.2	143-150	0.858	1.450	125
4-Amino-2-butanol	$CH_3CH(OH)CH_2CH_2NH_2$	89.2	175-185	0.918	1.453	140

Sharples Chemicals Inc. SHARPLES TRADE MARK CHEMICALS PHILADELPHIA • CHICAGO • NEW YORK

SHARPLES SYNTHETIC ORGANIC CHEMICALS

PENTASOL* (AMYL ALCOHOLS) — BURAMINE* (BUTYL UREA, Tech.)
PENT-ACETATE* (AMYL ACETATE) — PENTAPHEN* (p-tert-AMYL PHENOL)
PENTALARM* (AMYL MERCAPTAN) — VULTACS* (ALKYL PHENOL SULFIDES)
PENTALENES* (AMYL NAPHTHALENES)

AMYLAMINE — ETHYLAMINE — BUTYLAMINE
DIAMYLAMINE — DIETHYLAMINE — DIBUTYLAMINE
TRIAMYLAMINE — TRIETHYLAMINE — TRIBUTYLAMINE

DIETHYLAMINOETHANOL
ETHYL MONOETHANOLAMINE
ETHYL DIETHANOLAMINE
MIXED ETHYL ETHANOLAMINES
DIBUTYLAMINOETHANOL
BUTYL MONOETHANOLAMINE
BUTYL DIETHANOLAMINE
MIXED BUTYL ETHANOLAMINES

TETRAETHYLTHIURAM DISULFIDE
TETRAETHYLTHIURAM MONOSULFIDE
TETRAMETHYLTHIURAM DISULFIDE
ZINC DIETHYLDITHIOCARBAMATE
ZINC DIMETHYLDITHIOCARBAMATE
ZINC DIBUTYLDITHIOCARBAMATE
CUPRIC DIETHYLDITHIOCARBAMATE
SELENIUM DIETHYLDITHIOCARBAMATE

AMYL CHLORIDES — o-AMYL PHENOL — MIXED AMYLENES
DICHLORO PENTANES — DIAMYL PHENOL — AMYL SULFIDE
DIAMYLPHENOXY ETHANOL

* Trademark Registered

SHARPLES CHEMICALS INC.

EXECUTIVE OFFICES: PHILADELPHIA, PA.
PLANT: WYANDOTTE, MICH.

Sales Offices

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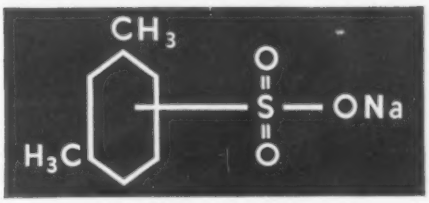
West Coast: MARTIN, HOYT & MILNE, INC., Los Angeles . . San Francisco . . Seattle
Canada: SHAWINIGAN CHEMICALS LTD., Montreal, Quebec
Export: AIRCO EXPORT CORP., New York City

WYANDOTTE SODIUM XYLENESULFONATE

FOR HYDROTROPIC SOLUTIONS · a chemical with* U.C.P.

INCREASES THE SOLUBILITY OF MANY ORGANIC AND INORGANIC COMPOUNDS IN AQUEOUS SYSTEMS



MOLECULAR WEIGHT 208

Sodium xylenesulfonate is available from semi-commercial production. Address inquiries for samples and further information to the Development Department. Wyandotte's technical staff stands ready to aid you.

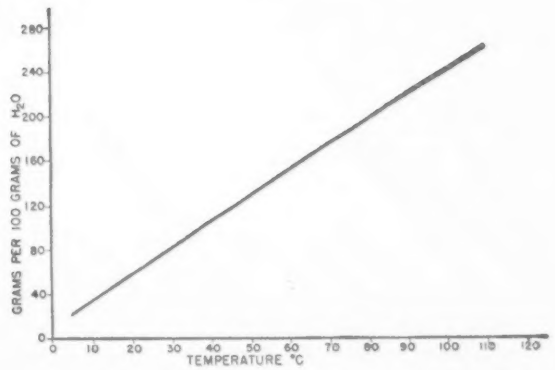
HYDROTROPIC PROPERTIES

Solutions of sodium xylenesulfonate have the property of "salting in" or increasing the solubility of many slightly soluble chemicals in aqueous systems. This unique property makes sodium xylenesulfonate attractive for numerous processes employed in the chemical industry. It is suggested for solvent extraction, speeding up chemical reactions, lowering of the reaction temperatures required for certain reactions, as a mutual solvent for increasing the solubility of organic compounds in aqueous systems, speeding up two-phase (liquid-liquid) organic reactions, for purifying organics, as a solvent for lignin and pentosans, and for increasing the water solubility of many sparingly soluble inorganic salts.

PHYSICAL AND CHEMICAL PROPERTIES

Wyandotte sodium xylenesulfonate is available as an aqueous solution in which the approximately 40% solids are primarily the sodium sulfonate derivatives of the 1,3-isomer with small amounts of the derivatives of the 1,2-isomer. The solution is straw colored, slightly alkaline (pH at 25°C,—7.5 to 8.5), has a faint sweet odor and contains less than 2% inorganic salts. Solutions of sodium xylenesulfonate exhibit moderate wetting properties.

SOLUBILITY OF THE ANHYDROUS SALT IN WATER



***U.C.P. means Undiscovered Commercial Potential**

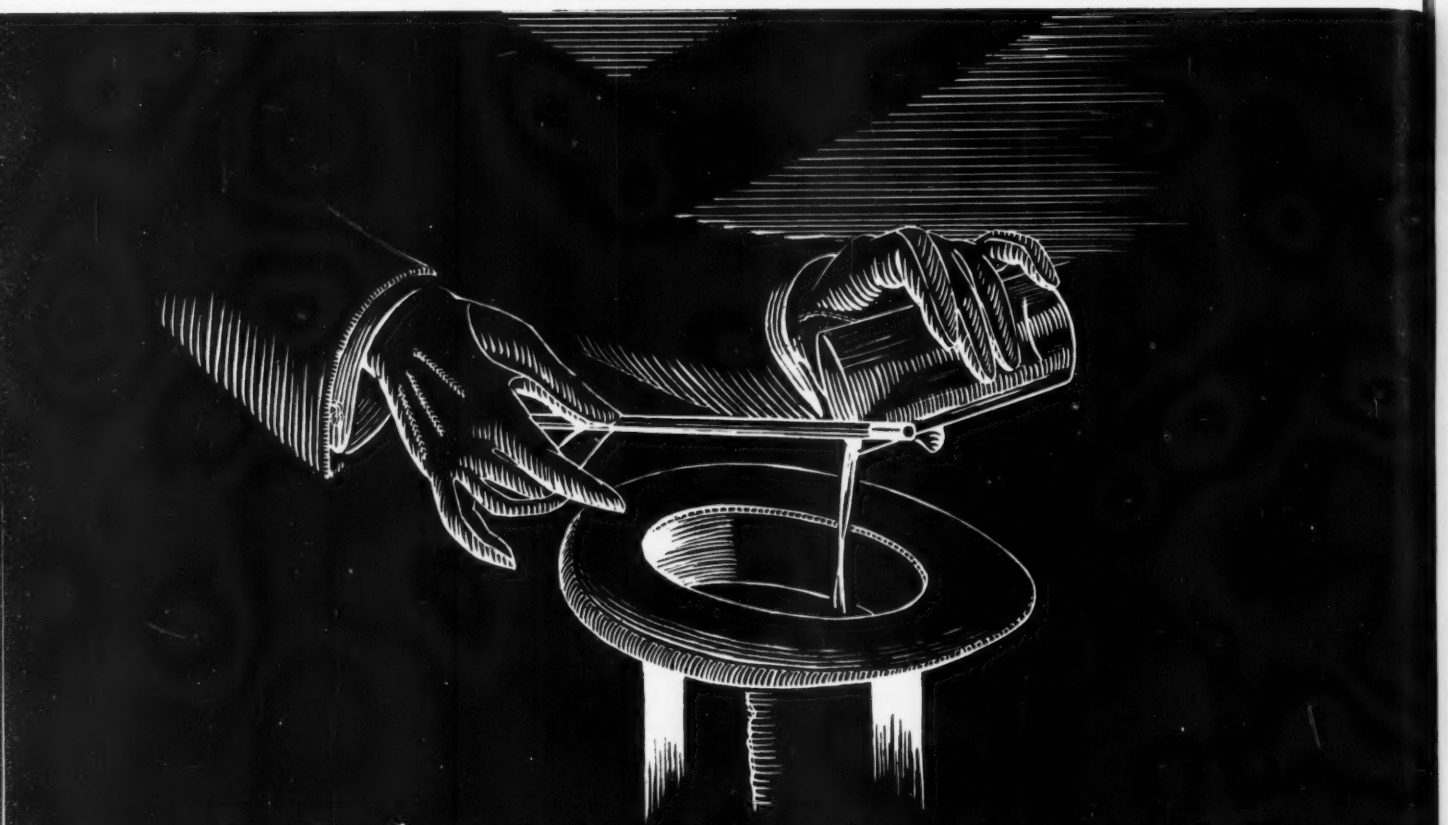
Wyandotte
REG. U. S. PAT. OFF.

OFFICES IN PRINCIPAL CITIES

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN

•

Soda Ash • Caustic Soda • Bicarbonate of Soda Calcium Carbonate • Calcium Chloride Chlorine • Hydrogen • Sodium Zincates Aromatic Intermediates • Dry Ice • Other Organic and Inorganic Chemicals



It Isn't MAGIC with NUCHAR *It's* "KNOW HOW"

It may seem like magic that NUCHAR Activated Carbon works so well in purification processes, but it isn't. It's "Know How" based upon many years of experience.

Take the case of fats and oils, for example. Individual oil and fat problems are continually studied in the Nuchar Research Laboratory which is available at all times for consultation and collaboration. Our technical staff is composed of experts on the purification of fats and oils. The application of activated carbon to fats and oils is now a recognized procedure consisting essentially of mixing and filtering. However, there are many tricks, even in such simple operations, which are learned only by experience and extremely close attention to details.

Such "Know How" has made good beer better; drug products purer; whiskey devoid of "slop" odor; and city water supplies palatable. NUCHAR is made in a wide variety of standard qualities for diversified industries. In addition to these standard qualities, some tailor-made grades are produced in order to solve specific problems.

INDUSTRIAL CHEMICAL SALES, Division West Virginia Pulp and Paper Company, 230 Park Avenue, New York 17, N. Y., 35 E. Wacker Drive, Chicago 1, Illinois, 748 Public Ledger Bldg., Philadelphia 6, Pennsylvania, 844 Leader Building, Cleveland 14, Ohio.

Industrial Chemical Sales, Division West Virginia
Pulp & Paper Company, 230 Park Avenue, New York 17, N. Y.

☐ Send me "The Modern Purifier" booklet on Nuchar Activated Carbon.

☐ Send sample of Nuchar (indicate use for which intended).

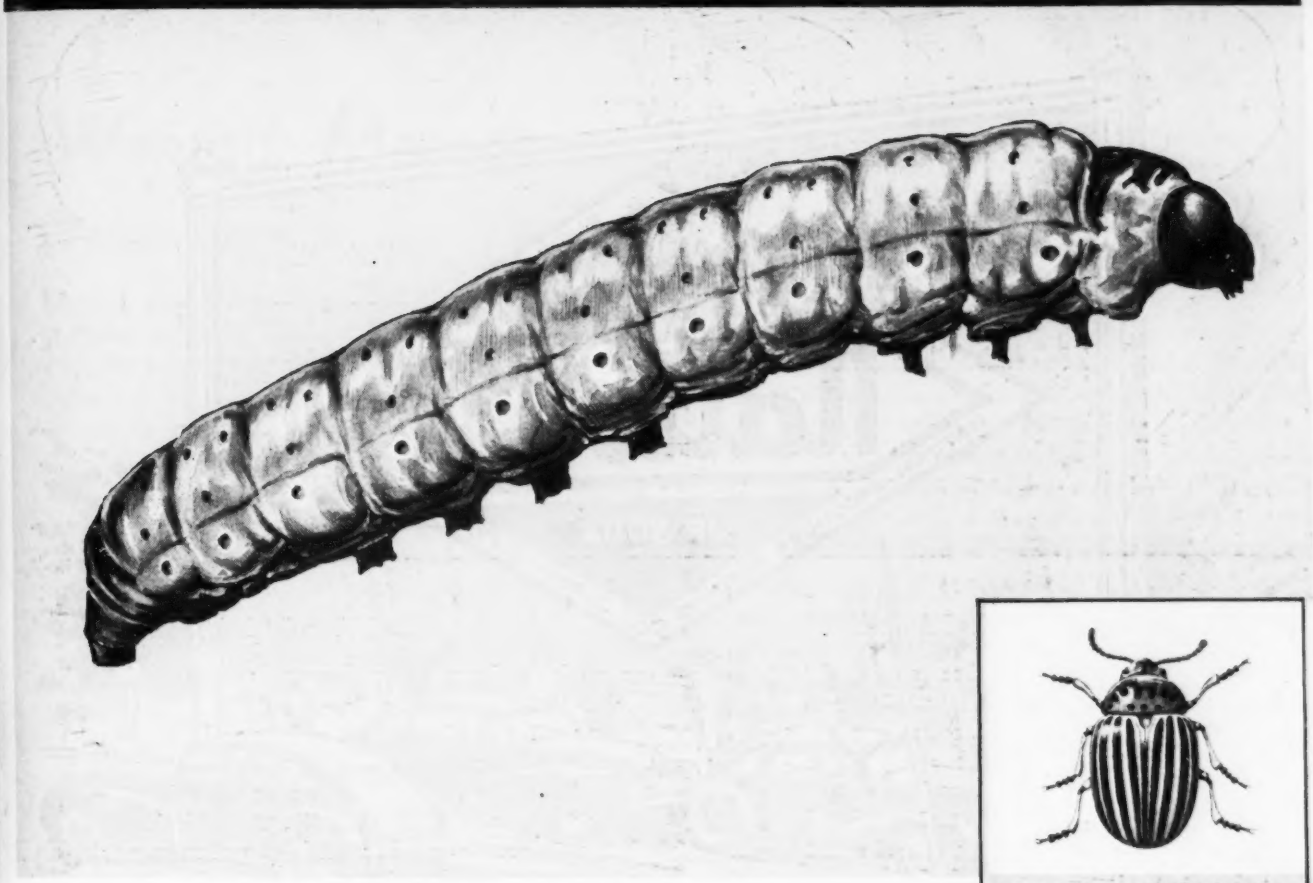
Name .....

Company .....

Address .....

Nuchar
ACTIVATED CARBON
NUCHAR

CODLING MOTH—causes millions in annual damage to apples and other fruits



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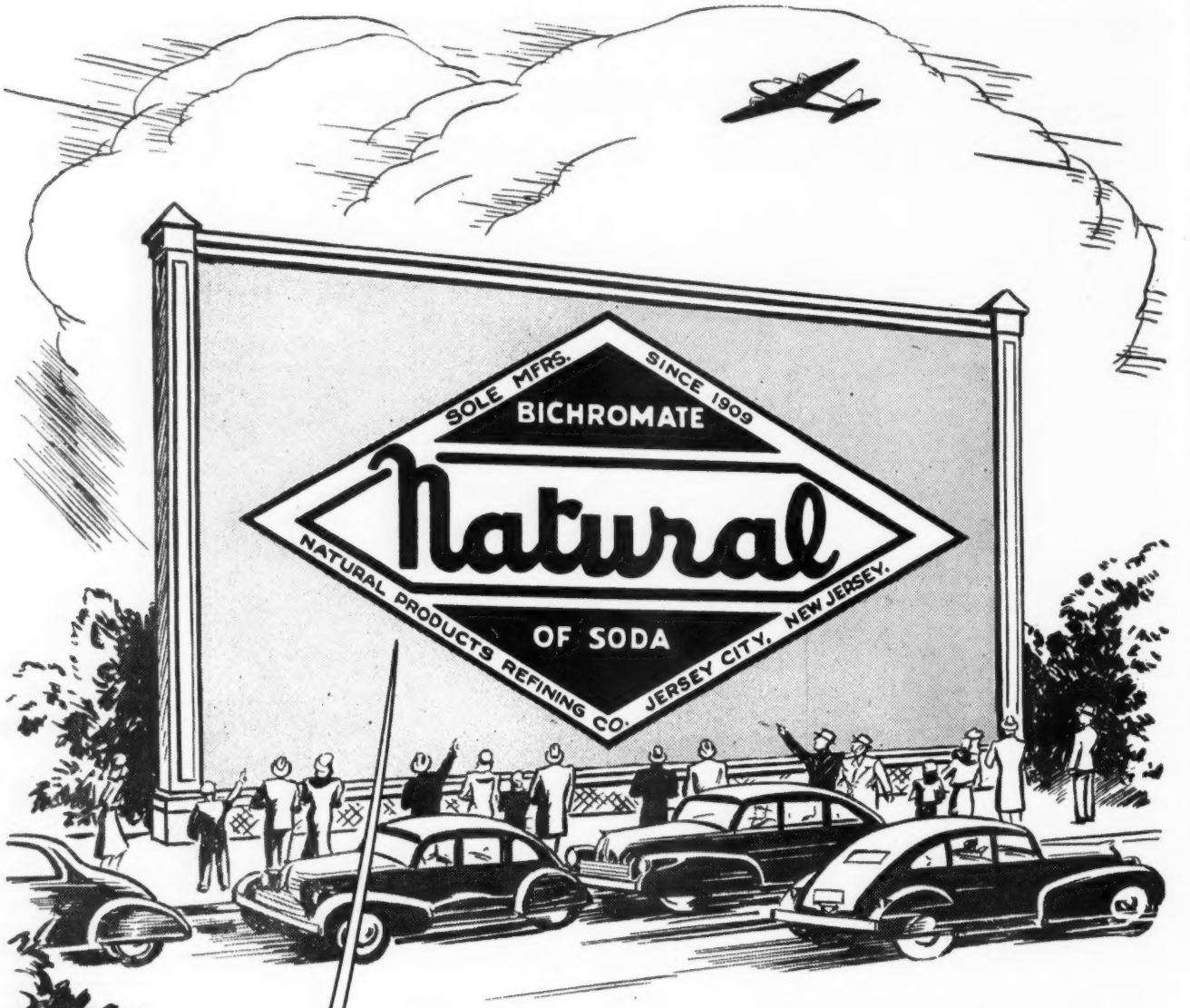

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Wanted: Managers

by ROBERT L. TAYLOR, editor

DURING THE WAR a large soap manufacturing company was asked by the War Production Board to take over the construction and operation of a shell loading plant for the Government. The company protested. Its people knew nothing about shells or shell loading. The job was largely mechanical, calling for production line techniques, and its relation to soap making seemed about as remote as possibly could be found. But WPB insisted. The plant was built and operated, and its production record was one of the best of such plants in the country.

Behind this little story was one of the most critical but least publicized bottlenecks of the war: the shortage of good management.

The soap company had but one qualification for the shell loading job, and that was a capable, aggressive, experienced top management, along with some able production executives who had not yet been required to spread themselves quite as thinly as those of some other war-swollen companies. To WPB this one qualification was heavy enough to outweigh all of the obvious deficiencies, a judgment which was not long in proving itself correct.

In another case, one of our largest chemical companies, whose contributions to the war effort will perhaps never be fully known or appreciated, was finally brought to the point where it simply could not take on any further war contracts, not because it couldn't get materials or facilities or know-how, but because it had been stripped bare of management talent of the caliber required to run the projects.

The war is over, but there is still a shortage of good managers in the chemical industry. We do not mean that vice presidencies are any more available for the asking than they ever were. Indeed the process of selection has perhaps become more exacting if anything. But it is evident that companies all through the industry are quietly on the lookout for any promising executive timber that comes along. In general, candidates must have had experience in some phase of the industry, in the course of which they showed greater than average ability for administrative work, and the chances are that some technical background is a requirement, or at least highly desirable.

It is encouraging, many top executives feel, that more technical men are not only aspiring to managerial jobs but are recognizing that such work requires certain special talents that can be cultivated and are taking steps to do so. As success in chemical manufacturing becomes more and more contingent on proficiency in research and technology, it is reasonable to expect that an increasing proportion of the top jobs will go to men with more than a layman's appreciation of the technical aspects of the business.

This does not mean, however, that technical knowledge will ever be an acceptable substitute for good business sense or any of the other qualities of a good executive. The technical man who finds it difficult to become interested in things outside his own specialized compartment of knowledge, will do well to stick to his chemistry or engineering and find happiness in what he is doing. It is cardinal that management have an understanding of the interconnections and interrelationships within its company, its industry and in fact the world in general, large as that area is. There is seldom any shortage of solutions of problems in terms of research alone, or of engineering alone, or of production alone, or of sales alone, or of accounting alone, or of finance alone. But the health and success of a chemical enterprise does not depend on the chemist or the engineer or the accountant or the salesman by himself. Only the man with breadth of vision and understanding is equipped to manage, to find and act on whatever solution is right.

The chemical industry holds out much in the way of incentives to capable managers in the period ahead. The war has brought forth many new applications of chemistry and physics which lend themselves to commercial development. New and larger markets for almost all chemical products await fulfillment. New chemical raw materials sources are opening up while those in many other fields are being depleted. Although enjoying some of the fruits of maturity, the industry at the same time is still young and dynamic. New frontiers are constantly unfolding.

Not only is there room at the top for those who will prepare, but the top today is still far from the ceiling in the chemical industry.

How Much Do Export Sales Cost?

A REASON SOMETIMES GIVEN for not cultivating foreign markets more enthusiastically is the cost of export sales as compared with domestic sales.

Edward M. Melton, export manager of the Ansco Division of General Aniline & Film Corp., in a recent appearance before the Chemical Market Research Association, observed that management would do well to make sure it has the true picture before it draws comparisons between foreign and domestic sales costs. It should not overlook the fact that such expenses as advertising, product literature, trade shows, technical service, public appearances of members of the organization, do not normally show on the accounting record as charges against the sales department, although they are obviously for the purpose of promoting sales—domestic sales. Export sales seldom have such outside helps. When these additional expenses are accordingly taken into account, the picture frequently changes.

Another factor sometimes overlooked is the specialized knowledge and handling required for export sales. As in most lines of endeavor, the inexperience of the novice is usually more costly than the higher price but greater efficiency of the expert.

Both of these points are worth remembering by managers of chemical companies engaged in or contemplating foreign sales. While cost of sales should not alone be the determining factor in entering the export market, it is obviously important as far as determining the profits held by such markets is concerned, and its true relationship to cost of domestic sales should be obtained.—R. L. T.

Treat Them Like Men

A FRIEND OF OURS, a research chemist in one of the larger chemical companies, dropped in to see us recently in the course of a job-hunting expedition. He was not dissatisfied with his work or his salary, but he could no longer tolerate being treated like a common laborer. During his three years with the company, not once had he been permitted to forsake his test tubes and his still pots for a day to attend a professional meeting or to learn more about his company's operations.

Similar complaints have been voiced in other quarters. Another chemist, for example, was not allowed by his superior to visit the company's plant where the results of his research were being applied commercially: He would lose a day in the laboratory. How much more would his work gain from the perspective obtained from the larger view!

We will concede that a punch-press operator or a ditch digger is valuable to his employer only while he is operating his press or digging his ditch. Whatever time he spends away from his appointed task is lost time as far as the company is concerned. But can we apply the same criterion to a research chemist? We hardly think so. Long after the 5 o'clock whistle blows his problem is revolving in his brain. A bright idea may come to him, indeed, before he falls asleep at night. Or a chance conversation with a chemist friend at a professional meeting may result in a suggestion which will save his employer time and money.

Research, like any other creative enterprise, is largely an exercise of imaginative ability, and—like any other creative enterprise—it requires a zealous, zestful and inspired approach. Research requires certain elements in the soil for vigorous growth; among these are enthusiasm, professional pride and, most of all, the opportunity to learn through observation, asking questions, and associations with one's fellows. Without these, discontent sets in, imagination is aborted, and fruitful research withers and dies.

Give your research man a chance to see how and where his work fits into the general scheme of things. Respect his professional standing and his intelligence by giving him the opportunity to reason why. You will be rewarded, we are sure, with a more enlightened and enthusiastic effort on his part.—H. C. E. J.

Achievement?

DURING THE PAST FEW YEARS considerable self praise has been heard anent the marvelous achievement involved in the operation of a newly constructed plant at more than 100 per cent of designed capacity. This self congratulation in many cases would seem to be an admission of weakness rather than strength.

Overdesign usually results from one of four things: (1) insufficient knowledge of the process to enable the designers to predict the design capacity; (2) lack of design skill on the part of the designers, requiring overdesign in order to be sure that a given capaicty will be reached (this might be more plainly labeled poor engineering); (3) a decision by management that it would be better economy of either time or money to overdesign than to carry out necessary pre-design experimental work; or (4) insistence on uneconomic safety factors by other departments of the company.

During the war years there have often been extenuating circumstances, such as an overnight AAA priority demand for a product not previously manufactured, or lack of sufficient manpower to carry out a project in the normal manner. Even in ordinary times there are conditions which make overdesign of certain parts of a plant desirable. Such a case would be when management believes that there is a good possibility of further plant expansion in the near future.

And then, of course, there are those cases where the plant is properly designed, and operating and research personnel later evolve new shortcuts which up capacity. An instance was the TNT plants during the war when capacity of the powder lines was more than tripled by a simple reversal in oil-acid mixing.

Recognition should most certainly be given where it is due. But before shouting self-praises, let us make sure we have something to shout about.—H. W. Z.

If the development of an organic chemicals industry has proved to be of first importance to us as a nation, how very important indeed must be the expanding vistas of science which now open before the eager eye of the research worker!—DR. C. M. A. STINE.

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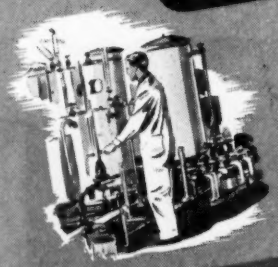

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MARCH, 1946

EUROPE NEEDS CHEMICALS

But We Must Know How To Serve Her

by WILLIAM F. ZIMMERLI, New York, N. Y.

THERE IS AN OPPORTUNITY across the Atlantic today for American chemical producers who are willing to meet local European conditions. The stake is not only immediate markets but a permanent freeing of European industry from German technical domination so that it may take its place among the free markets of the world. The immediate need is imports of chemicals, particularly specialties, and later on participation with European interests in providing manufacturing facilities outside of Germany. Basic to all of this is an intimate knowledge of customs and conditions prevailing among European chemical consuming industries, and an understanding of the fundamental differences between them and their U. S. counterparts. It is some of this essential background that Dr. Zimmerli so admirably presents here, based on his many years as a representative of a major American chemical firm in Europe.

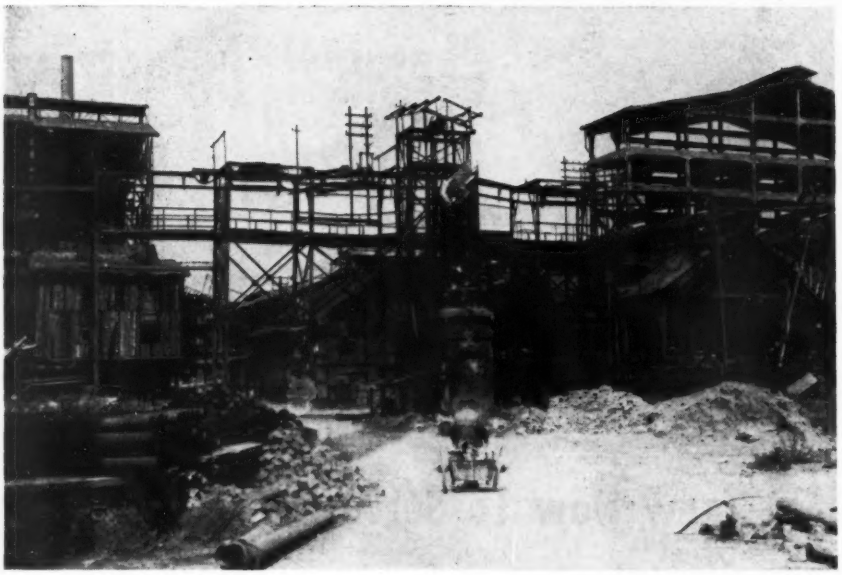
THE DEFEAT, cessation of chemical manufacture, and the proposed de-industrialization of Germany present great problems for the peacetime readjustment of the European economy. Regardless of how accomplished, whether we like it or not, the fact remains coldly before us that the European economy was dependent in a very large measure on the chemical manufacturing facilities and the research and technical service of the German chemical companies. Europe is today faced with a chemical vacuum which must be filled. For the immediate future, manufacture of consumer goods all over Europe will be retarded pending partial resumption of German chemical production and establishment of additional chemical plant facilities in other new locations. This, however, must be considered as a long term development and intelligent assistance and cooperation of American chemical manufacturers is called for in the solution of both the immediate and long term problems.

The building up of the peacetime prosperity of the European people is of great importance to our own prosperity and to the peace of the world. Our government can render emergency assistance through loans to finance the importation of materials vital to recovery, but for the long term the Europeans must build up facilities and acquire the technical know-how to manufacture the products required for home consumption. Continued United States financing of imports of consumer goods by Europe cannot be contemplated for practical reasons. Europe must become substantially self-supporting at the earliest possible time. Private enterprise can contribute more effectively to Europe than government aid. Aside from the broad altruistic motives of our responsibilities, the aid which our industries can give Europe will offer attractive returns over a period of years. The benefits can include profits from exports, participation in new enterprises, and potentialities in the availability of new technical improvements and products.

In the study and planning by individual American enterprises of the part they

THE AUTHOR

Dr. Zimmerli is well qualified to write on the subject of serving Europe's chemical needs. From 1933 to 1939 he was European Technical Representative of the DuPont Company, with the job of keeping the various research and development divisions of the company informed of all technical and scientific developments in Europe. This included the study of local political and economic conditions, the study of research organization and planning in Europe, and the supervision of sponsored research in various European laboratories. Dr. Zimmerli is now engaged in independent consulting work.



Bomb-damaged plant of the Chemische Werke-Albert, one of the chemical plants manufacturing phenolic resin glue at Wiesbaden, Germany.

can and should take in this important postwar activity, a realistic and factual attitude is essential. It is important that each industry clearly understand the European situation relative to its operations and the differences in technical and trade customs there as compared with those in the United States. European industry was developed over a long period of years under conditions of nationalistic political economic rivalry, and traditions steeped in dogmatism have had an important effect on the character of its development. This is in contrast to the American industrial economy which was built up in a large geographic national union with abundant raw materials and large population markets in a free country.

Although some adjustment of policy for foreign operations is required to meet local European conditions, American companies can enter this field with confidence that they are equal to, and in most cases superior to, their European counterparts. This includes the I. G. and other German concerns. Those familiar with the American chemical and allied industries know from prewar experience that in spite of much publicity activated by war emotions, the Germans did not dominate U. S. chemical activities, nor did they do a better job of research and development than we did. Many years' experience in Europe studying the chemical and allied industries has clearly revealed that, although we can profit by adoption of those inventions and advances of value to the American economy which result from European research, Europe has more to gain from the United States in research, engineering, and manufacturing techniques than we have from Europe.

It is important to understand the four outstanding differences between the practice of chemical industry in America and in Europe: (There are marked differences in the character and temperaments of the people of the various European countries, and the conditions generalized in this discussion vary accordingly in degree, but basically they prevail throughout the continent.)

(1) The chemical consuming industries of Europe are almost wholly dependent on the chemical industry for chemical research in their respective fields. This was one of the ways by which Germany, as the leader in chemical production, was able to dominate much of the rest of continental European industry.

(2) The competitive situation in European industry differs materially from that in American industry.

(3) The large potential volume market for specialty chemicals, so attractive to the American chemical industry, due to mass production in the chemical consuming industries, is not generally existent in Europe.

(4) A wide variety of chemical raw materials is not readily available in any single European nation as in the United States.

TECHNICAL SERVICE MORE IMPORTANT

The almost complete dependence of European industry on the chemical industry for research in its field is a result of the traditional growth of the chemical industry in Europe. This dates back to the expansion of the European chemical industry from standard so-called heavy inorganic chemicals and materials extracted from natural products to synthetic organic specialties which started with the development of synthetic dyestuffs. The introduction of these proved very profitable and accelerated the development of a large variety of types and individual colors. These required special technical skill in their application and the dyestuff producers found it to their advantage to organize highly skilled laboratories to demonstrate their products to the dyers. In the active competition among the dye manufacturers this technical service extended to all phases of the textile industry, leading toward entire dependence of that industry on the research of the chemical companies. In this new chemical venture the Germans pioneered and at the outbreak of World War I had entrenched themselves throughout the world before effective competition could be established.

The technical skill of the German dye laboratories in the use of chemicals was expanded to other industries leading toward the development of new chemicals to improve products and processes in other chemical consuming industries. The responses to this expansion of activity by the chemical companies were different in Europe and the United States.

In Europe a major proportion of the chemical consuming industries did not have the volume of business required to warrant matching the extensive research provided by the chemical companies. Thus, they continued to rely on them for the technical progress in their field and the German companies with no resistance from their customers, were able to maintain a dominating influence as the principal supplier of chemicals for all of Europe.

The development of American chemical manufacturing and consuming industries did not follow the traditional European pattern. The textile industry's reliance on its suppliers of dyes and auxiliary chemicals established by the Germans before World War I was continued, but other industries followed a different course. American industry was geared to mass production to attain lower costs and volume low price sales. Our antitrust laws created aggressive competition for the large market outlet, stimulating the need for lower costs and improved quality through research. The resources from volume sales enabled the chemical consuming industries to develop their own large research organizations supplementing those of the chemical producing companies.

These large research organizations not only freed their industries from dependence on the chemical suppliers for their technical developments, but also created a highly competitive situation in the chemical manufacturing industries. It has become standard practice for large chemical consumers in the United States to resort to the manufacture of their own chemical requirements if chemical manufacturers do not supply these of satisfactory quality or at suitable prices. The results of their research enable them to determine which chemical products are best suited for their operations, thus stimulating the manufacture of new chemicals. They dictate their requirements and specifications. The United States chemical consumers

are thus wholly independent of possible domination by chemical manufacturers whose continued existence is dependent on quality and price and the services they can render their customers on a competitive basis.

An outstanding example of this important difference between the United States and Europe is found in the rubber industry. In the United States, the highly competitive research organizations of the different companies as well as the chemical company research laboratories provided great flexibility in the choice of problems and their solution by varied means. In Europe, on the other hand, this research was left almost wholly to the I. G. laboratories where it was found necessary to establish rubber manufacturing operations to carry the results of their researches through the production stage. With only one major research organization to serve the important rubber industry in continental Europe, and that having the narrow interests of a chemical manufacturer, technical progress was naturally restricted.

This major difference in industrial development practice existed in general among the other chemical consuming industries.

MARKETING CONDITIONS

It is natural that the different types of customers of chemical companies in Europe and the United States would create important differences in the marketing of chemical products.

In the United States the technical staffs of the major chemical consumers know as much or more about the use of chemicals in their operations than the suppliers do and insist on knowing the structure and chemical composition of products offered by the chemical companies. Most trade names in the United States are either used as convenient abbrevations of long chemical terms, which soon become generic for all producers, or they are used to identify the known product of a particular producer.

In Europe, on the other hand, most of the chemical consumers, relying on the producers for their research, are usually satisfied to purchase chemicals by trade names without knowing anything about their constitution; in fact most chemical companies refuse to identify their product chemically. In many cases the chemical name of a product would not have any more meaning for a customer than its trade name. It is not uncommon for even large chemical consumers to purchase the same chemical at different prices for different uses under several trade names without being aware of the fact. Such practices offer an opportunity for European chemical suppliers to obtain exorbitant prices for trick combinations much more readily than in the United States. With German chemicals unavailable to the European industries, the possible substitution of products formerly purchased under trade names originating in Germany offers real complications.

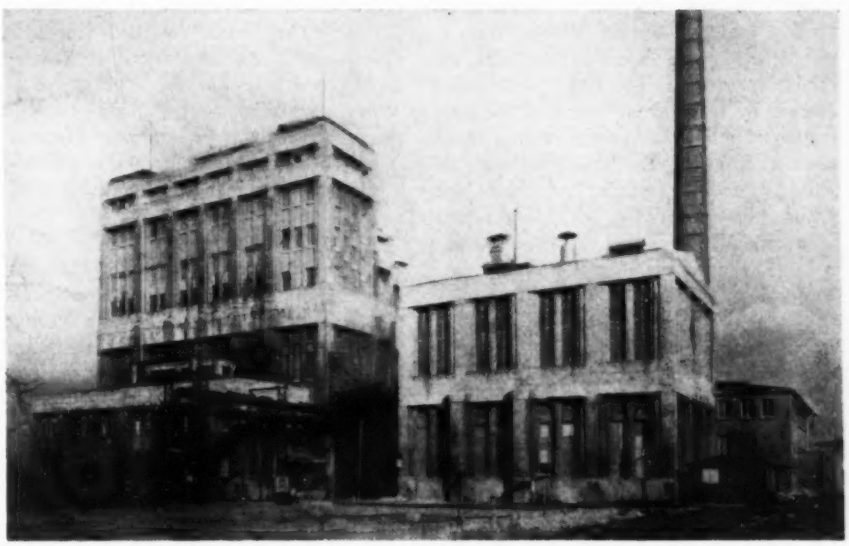
Before the outbreak of World War II, however, there was a definite tendency away from the conditions existing in Europe, and this trend will probably be accelerated by the chaotic conditions resulting from the cutting off of German chemicals. As an outstanding exception, mention should be made of the refusal of the Bata Shoe Company in Czechoslovakia to accept continued domination by its chemical suppliers. This organization following the general practice in the United States, found it greatly to its advantage to maintain a large research laboratory which enabled it to become wholly independent of suppliers through the threat of own manufacture of its raw materials (based on ability to perform) when it did not consider prices or quality satisfactory. It refused to purchase trade named products where constitution was not disclosed. Thus the European economy was provided with quality low-priced shoes which were eagerly purchased by consumers throughout the continent. However, the success of this organization created international complications where imports at lower prices disturbed the more complacent home industries.

DIFFERENCES IN COMPETITION

The United States industrial development based on the principle of mass production for sale at increasingly low prices to promote mass consumption has not been approached anywhere in the world. This is most clearly illustrated by comparing the per capita consumption of crude rubber (a basic raw material for almost all industrial activities) in the United States and Europe. In 1927 the United States with a population of 123,000,000 consumed 6.76 pounds per person per year, as against consumption of only 0.6 pounds per year per person for Europe's 388,000,000 population (outside of Russia and including the United Kingdom.) The respective figures for 1937 were 9.78 to 2.1 pounds per capita. While the per capita consumption of crude rubber was an integral part of the entire American economy, enjoyed by all, that in Europe varied in the different nations of Europe in 1927 from 0.034 pounds per capita in central Europe to 1.71 in France, 1.26 in Germany and 2.22 in the United Kingdom.

The conditions which fostered the outstanding industrial development of the United States had a marked effect on the character of the competition of the American chemical industry as compared to that in Europe. The free expansion of the European economy was hampered by the tariff barriers and antagonistic economic and political policies engendered by the diverse nationalistic aims of the many small nations there. The American economy expanded freely and under uniform rules over a large population and geographic area practically self-sufficient in raw materials. The inability or unwillingness of the European countries to get together following World War I to adopt uniform economic laws and fair trade practices is an important factor in the continued dependence on German chemical manufacture in Europe.

The centralization of world synthetic chemical manufacture in Germany was outstanding at the outbreak of World War I. While efforts were being made in other parts of the world to produce dyes, pharmaceutical and other synthetic specialty chemical products, the aggressive and frequently not too ethical policies of the German manufacturers generally reduced these to an ineffective state. The dangers of permitting this condition to continue after the close of the war was recognized everywhere and the urge of self-preservation among the nations of Europe fostered economic nationalistic policies to encourage the expansion of chemical manufacture within their own



Plant at Mannheim, Germany, for the production of alcohol and yeast from wood.

borders. Considerable progress was made in the establishment of chemical manufacture in France, Switzerland and Czechoslovakia, but the complete dispersion of chemical manufacture throughout Europe was countered by the combination of the principal manufacturers in Germany to form the I. G. The combined resources and research abilities of this group were able to substantially maintain the German dominance of the industry in Europe up to the start of World War II.

This dominance is the more important for European postwar developments because it applied more to the manufacture of specialty and comparatively new chemical products than to the standard competitive type products. Most of these newer chemicals, vital to almost all phases of manufacturing industries, were not manufactured in other parts of Europe, and provision must be made to produce these chemicals outside Germany before Europe can free itself from German domination. It is to this phase of postwar European development that American chemical companies can contribute, first through the exportation of specialty chemicals, and subsequently by assistance to or participation with European interests in the building up of facilities and providing technical know-how for manufacture outside of Germany. Both Americans and Europeans can benefit greatly by cooperation in such reconstruction activities.

The determination of Americans to free themselves from German domination, so acutely manifest during World War I, met with greater success than was attained in Europe. The large free market created by mass production and the protection of uniform anti-trust and fair trade laws throughout the country, together with protective tariffs, provided the proper conditions to create a large and aggressive chemical industry in this country. Composed of large and small companies, all operating under the same rules and complementary with each other in activities, it not only surpassed the combined production capacity of the Germans but demonstrated superior engineering and production ability.

Those who have had an opportunity to make a critical comparison between German and American research and development accomplishments know that our overall progress in sound economic chemical developments far overshadows that of the Germans. War psychology emphasized the German developments in synthetic rubber, gasoline, fats, etc., out of all proportion to their peacetime importance. As the prophet is never honored at home, war emotions would not be stimulated by publicizing the facts that the first successful commercial world production of synthetic rubber, the development of nylon, the establishment of an important branch of chemical manufacture based on aliphatic chemistry, the industrialization of synthetic resins, etc., are products of American ingenuity and ability. Instead of dominating the American chemical industry, the Germans were hard pressed in the late prewar period trying to keep up with the American pace. Instead of dominating our industry, they were forced to accept the invasion of their almost exclusive territory by the increasing exports of chemicals from the United States. They were not even able to prevent increasing sales of United States dyestuffs in Europe.

THE CARTELS

In any comparison of business conditions in Europe and the United States, the existence of cartels must be recognized. No one will dispute the fact that they do not fit into the recognized practices permissible in this country. They are the result of conditions existing in Europe and until these conditions are changed we must accept them as existing facts, whether we like them or not. Oddly, they are the result of an attempt on the part of European industries to establish universal rules for conducting international business which we accomplish in interstate commerce through laws formulated by our government. As the rules established in a cartel are formulated with the object of benefiting the participants with little attention to the overall economy and in most cases the decisions were influenced by the dominating producers, they fall far short of discouraging monopolies and establishing fair trade practices as interpreted in the United States. They have retarded European developments by allocation of market quotas, which lessens the urge to reduce selling costs or to improve quality through research or capital investment. They assisted Germany in maintaining her strong position of chemical manufacturing.

NO MASS MARKETS

The large volume of chemical consumption by the mass production industries in the United States offers attractive potential sales of new specialty chemicals. A comparable situation does not exist in Europe. In our competitive economy, successful industrial operations require the alertness of organization in utilizing every effort to reduce costs and improve quality without increasing costs. The substitution of one chemical for another or the modification of processes utilizing new chemicals can be of major importance in aggregate savings or improving quality. American chemical companies, encouraged by potential large volume sales of new products, are continuously offering alternate materials for adoption by the laboratories of the consuming industries. This aggressive competition has provided the American economy with a relatively unlimited supply of alternate chemical products to effect the lowest cost and highest quality. One has but to mention the large number of solvents, until recently known only in research laboratories, which are produced in volume in this country. Many of these were not produced even by the I. G. in Europe before the war. This large volume production, often with lower cost raw materials, provides unique opportunity for United States manufacturers to develop a European market.

RAW MATERIALS

The great difference in raw material availability must be considered in a comparison of European and American chemical developments. A producer or potential producer of chemicals in the United States can depend on the availability of any raw material produced anywhere in the country on equal terms with others to produce products which he can in turn sell anywhere in the United States on equal terms with others. Were this condition to exist in Europe, industry would be free to disperse throughout the continent as it is doing in the United States.

However, the European economy was not permitted to develop in this logical way because the intrigues of economic nationalism made it of prime importance for any potential manufacturer to consider whether raw materials were available within his own borders. The average American would consider it ridiculous for a condition to exist here, as in Europe, whereby Swiss, Austrian, Dutch, etc., potential producers of chemicals, are reluctant to invest in an enterprise because coal or other materials must be imported from nearby countries. There are many cases where the expansion and diversification of chemical manufacturing in these countries was not undertaken for this reason alone. It will be of great importance to the dispersion of industry throughout Europe that this condition be corrected in the postwar reconstruction of the European economy.

PATENTS

The above-noted differences in the chemical manufacturing and consuming industries of Europe and the United States have greatly influenced the importance of patents before the war and in the postwar reconstruction. The publication of patents has been a stimulus to our large ingenious research organizations to find means of devising alternate methods for accomplishing the objective of the invention disclosed. In most cases they are successful. Where a foreign invention is basic and fundamental in nature and its use could contribute to the American economy, licenses to utilize it were arranged for by American companies. Except in very isolated cases, foreign owners of patents found it more to their advantage to license patents for use by existing American companies rather than accept the hazard of entering the highly competitive manufacturing field with probable early circumvention of the patent by established firms. As a consequence,

(Turn to page 515)

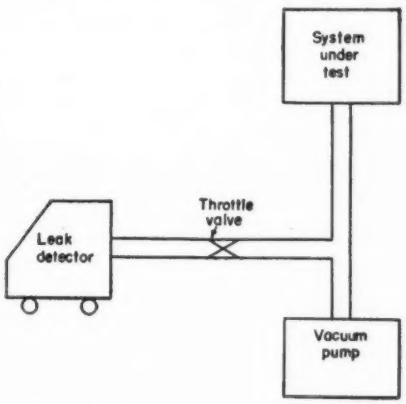
LEAK DETECTION by Mass Spectrometry

EDITORIAL STAFF REPORT

BY APPLYING the principles of mass spectrometry and utilizing helium as a tracer gas, the General Electric Co. has developed a device of such great sensitivity that it is capable of detecting a leak of 2×10^{-9} standard cc. of helium per second. When a helium jet is used as a probe, the location of a leak can be determined within ½ inch.

A MASS SPECTROMETER, adjusted to detect helium gas, comprises the new leak detector announced by the General Electric Co. at the recent 20th Exposition of Chemical Industries. It utilizes helium as a tracer gas and will detect one part of helium in 200,000 parts of air. The device responds in about one second and is capable of locating small leaks even in the presence of large leaks, the results being independent of test sample pressure over a wide range.

With the leak detector attached to the system as shown in the sketch below, the



indicating instrument will register the presence of helium in the system and thus indicate the source and magnitude of leakage. By using a helium jet as a probe to explore the outside of the system or by surrounding the system with helium gas, any leak in the system can be made to admit helium and, by measuring its concentration, give an indication of the presence and size of the leak.

OPERATION

Two methods of leak detection are commonly employed: the envelope method and the jet method. The envelope method involves the use of an envelope or container of helium to surround the vessel being tested. Diffusion of helium through any leaks which may exist allows a determination of the concentration of helium by the instrument to give an indication of the total leakage. To determine the exact location of the leak, the jet method must be employed. Here a small jet is held about ½ in. from the part and moved over the suspected area at about ½ in. per second. As the jet passes over the leak, helium is drawn into the system and registers on the output instrument. By this means leaks can be located within about 1/32 in., using a very fine jet with a small flow.

Test samples are connected to the leak detector through a throttle valve to allow adjustment of the flow through the detector for different values of pressure in the test sample. The pressure in the mass spectrometer tube, as indicated by the ion gage, must not be more than 10^{-5} mm Hg. The pressure in the test sample may be much higher. With the sample at high pressure the throttle valve must be partially closed, thus reducing the sensitivity. The speed of the response is reduced if the pressure is below the molecular flow range. When the pressure in the test sample is above 10^{-3} mm, the maximum allowable pressure rise can be maintained by adjustment of the throttle valve to achieve maximum obtainable sensitivity. If the sample pressure is less than 10^{-3} mm, and an auxiliary pump system is used, maximum pressure rise sometimes cannot be maintained. In this case it may be desirable to connect the detector between the diffusion pump and the rough vacuum pump on the sample system, or to throttle the auxiliary pumping system to maintain the pressure in the detector.

CONSTRUCTION

The main component of the GE leak detector is the mass spectrometer tube, including an ion source, a deflecting magnet, and ion collector and preamplifier.

For operation of the tube a rough vacuum pump (rotary oil type) and silicone oil diffusion pump with a dry ice trap are required to produce the vacuum for mass spectrometer operation.

Two vacuum gages are required in the system. One is the thermocouple vacuum gage and control with a range of 0-0.1 mm Hg. It is used first as a check on the rough vacuum before turning on the diffusion pump, and second to check the high vacuum before turning on the second gage which is of the ion type. The ion gage gives continuous indication of the spectrometer tube pressure in the range of 10^{-3} to 10^{-7} mm Hg. The ion gage control has an adjustable automatic cut-off which is usually set at 4×10^{-5} mm Hg. Pressure increases beyond this point will automatically cause both the ion gage and spectrometer tube filaments to be turned off.

SENSITIVITY

The sensitivity of the leak detector is such that a leak which would allow 1 cc. of helium at atmospheric pressure to pass in 16 years can be detected. The smallest detectable leak is 2×10^{-9} standard cc. per second, corresponding to a partial pressure of helium at the ion gage of 5×10^{-11} mm Hg. The normal helium concentration in air can be shown on the leak detector.

The leak detector is somewhat dependent upon the degree of vacuum in the sample, due to the dilution of the sample by other leaks. The overall response time of the leak detector to helium diffusion through the leak is usually of the order of one second. When helium is removed from the leak, the signal will disappear as quickly as the helium is pumped from the system. Clean-up time for the leak detector itself is about 3 seconds, and for the test system a little longer, depending upon system size and the auxiliary pumping equipment.

Nelson Gildersleeve of the Special Products Division of the General Electric Co. showing the new leak detector at the Exposition of Chemical Industries.

THIOGLYCOLIC ACID Rides the WAVES

by AARON ADDLESTON
Winthrop Chemical Co., Rensselaer, N. Y.

WHILE THIOGLYCOLIC ACID PRODUCTION has soared upward, its price has plummeted downward. This interesting material, used chiefly in permanent wave solutions and depilatories, may prove of value in textile processing, in petroleum and rubber technology, and in a score of other new applications.

THE HISTORY of industrial chemistry is studded with instances of meteoric rises in production, such as occurred with the sulfa drugs, Atabrine and penicillin. It is a tribute to the ingenuity of the American chemical industry that even while such essential war products were being manufactured on a colossal scale to meet the needs of the armed forces of practically all the Allies, the production of thioglycolic acid, a strictly non-priority product, has gone up from a few pounds per year for laboratory samples to a "guesstimated" 200,000 lbs. in 1944. Since the chief use of thioglycolic acid has been the formulation of cold hair waving solutions, and in the absence of any census figures on either production or end use dollar volume, this 200,000 lbs. "guesstimated" may well be off as much as 50 per cent. If this entire quantity had been used for wave solutions, there would have been enough for some 5,600,000 cold waves.

To the paper and graphite chemist, thioglycolic acid is a very simple substance:

$$HS—CH_2—COOH$$

It is more properly called mercaptoacetic acid and is indexed in Chemical Abstracts as a derivative of acetic acid. Ordinarily one would expect the name "thioglycolic" to be reserved for an acid in which one of the carboxyl oxygens of glycolic acid is replaced by sulfur:

$$HO—CH_2—COSH$$

The obvious starting material for its manufacture is the relatively cheap and abundant chloroacetic acid and the obvious reactant is an alkaline hydrosulfide.[1]

$$NaHS + Cl—CH_2—COOH \rightarrow NaCl + HS—CH_2—COOH$$

This was the process preferred by the Beilstein editors, who recommended adding a 20% aqueous solution of chloroacetic acid to 2 molar equivalents of a 15% solution of potassium hydrogen sulfide, heating for 15 minutes on a water bath and isolating as the barium salt.[2] With freshly prepared sodium hydrogen sulfide, a 99% yield is claimed,[3] but these conditions and results cannot be achieved commercially.

Modern commercial standards require that all H_2S in the reaction solution be removed. The normal odor of pure thioglycolic acid is unpleasant, but is not unduly difficult to mask.[4] Many of the obnoxious odors found in commercial thioglycolic acid can be traced to the incomplete removal of H_2S or to the by-products of its further reaction. In practice, moreover, the synthetic problem is complicated by the tendency of thioglycolic acid to oxidize in air to dithiodiglycolic acid:[5]

$$\begin{matrix} S—CH_2—COOH \\ | \\ S—CH_2—COOH \end{matrix}$$

or to split off H_2S with formation of the thioether derivative, thiodiglycolic acid:[6]

$$S(CH_2—COOH)_2$$

The dithiodiglycolic acid can be reduced with zinc dust and acid,[7] with granulated zinc and acid,[8] with tin and acid,[9] with sodium amalgam and weak acid,[10] or even by electrolysis in 2N H_2SO_4 with a lead cathode.[11]

A good yield of the dithiodiglycolic acid is obtained by heating a solution of sodium chloroacetate with sodium polysulfide.[12]

A more elegant and more expensive method, which avoids the troublesome plant problem of disposing of excess sulfides and which also leads to a thioglycolic acid of less objectionable odor, was proposed by Andreasch,[13] who found that thiourea and chloroacetic acid gave reasonably good yields of pseudothiohydantoin, $S—CH_2—CO—NH—CNH$ when heated in aqueous solution to 80 or 90° C. and who later showed that this condensation product could be hydrolyzed with barium hydroxide to yield thioglycolic acid and dicyandiamide:[14] $H_2NCNHNHCN$. In commercial practice it is not feasible to recover the dicyandiamide to advantage. Andreasch's process has the disadvantage of requiring the use of the relatively expensive thiourea.

Although thioglycolic acid can be readily distilled in vacuum on a laboratory scale, the yields fall off precipitously in commercial equipment and it is, therefore, customary to supply the acid in concentrated aqueous solution, usually between 75 and 90 per cent. The strength of vacuum-distilled acid tends to drop off by 7—10 per cent within a few weeks. One of the decomposition products is an analog of glycolid.[15]

PHYSICAL PROPERTIES

Anhydrous thioglycolic acid melts at —16.5°C. Recorded boiling points include 123° at 29 mm, 107-108° at 16 mm, 102.5—103° at 13 mm. The density at 20° is 1.3253. Thioglycolic acid is a somewhat stronger acid than acetic. There is some question regarding the accurate ionization constants: British investigators[16] reported $K_1 = 4 \times 10^{-4}$ and $K_2 = 1 \times 10^{-10}$, while the more generally accepted values[17] are $K_1 = 2.1 \times 10^{-4}$ and $K_2 = 2.1 \times 10^{-11}$. The normal oxidation potential is 0.27 volts at 25°C. The heat of combustion is 346.3 Kilocal/mole. Thioglycolic acid is miscible with water, alcohol, acetone, ether, chloroform, and benzene.

All of the important applications for thioglycolic acid depend upon the reactivity of the SH group as a reducing agent.

DEPILATORIES

As long ago as 1934, a patent on the process of dehairing hides and skins listed thioglycolic acid as one of a series of mercaptans claimed to be particularly effective.[18]

The theory of the dehairing action depends upon the fact that the proteins of hair include a number of cystine groupings. If we represent the cystine structure as R—S—S—R, the following equation may be postulated:

$$R—S—S—R + 2HS—CH_2—COOH \rightarrow 2RSH + HOOC—CH_2—S—S—CH_2—COOH.$$

Removal of the cystine sulfide linkages destroys the hair fiber and the residues can be easily washed away.

Wm. Fletcher, an Englishman, recog-

Permanent wave solutions account for the major share of present thioglycolic output.

nized that the same reactions could take place with living human hair, and recommended the use of mercaptocarboxylic acids or their salts at a pH above 10.[19] Fletcher suggested either 2-4 per cent thioglycolic acid or 3-6 per cent thiolactic acid, made alkaline with calcium hydroxide. A British patent, issued to Karel Boheman,[20] covers essentially the same ground. As a further refinement, Evans and McDonough suggested the following formula:[21]

Strontium hydroxide	50
Calcium hydroxide	15
Methylcellulose	11
Thioglycolic acid	15
Clay	102
Water	300

By 1940, the Food and Drug Administration officials reported that calcium thioglycolate (the essential reaction product in the above formulations) was being widely used in American depilatories. Formulas for pastes and creams were offered.[22]

On June 27, 1944, there was issued U. S. Patent No. 2,352,524 to Ralph L. Evans and E. G. McDonough, assigned to Sales Affiliates, Inc., of New York City, covering among other claims "a depilatory . . . comprising a preparation containing a substantial amount of a non-depilating vehicle carrying a mercaptocarboxylic acid and an excess of an alkaline reacting material . . . in amounts sufficient to give the preparation a pH value not greater than about 12.5." It is understood that an exclusive license has been given to the Schering Corporation, Bloomfield, N. J.

COLD HAIR WAVING

Traditional reagents for preparing hair for waving were alkalies, sulfites, bisulfites and the like, but these were effective only in hot solutions. About five years ago, a preparation employing ammonium hydrogen sulfide solution was widely distributed. Following a fatal accident, occurring as result of absorption of the sulfide, attention was quickly focussed on the possibilities inherent in the thioglycolates which required no heating. Although the original work was done with the triethanolamine salt of thioglycolic acid, it was soon found that an approximately 8.3% solution of ammonium thioglycolate (equivalent to 7.0% thioglycolic acid and ammonia) at a pH of approximately 9.4 was strong enough to permit rapid setting of the hair into a wave which could be fixed by application of dilute acidic hydrogen peroxide, bromates or other mild oxidizing agents. Theoretically, this so-called "neutralizing" solution restores the sulfide linkages which have been broken by the thioglycolate waving solution. In practice the skill with which it is applied may determine whether the wave will be "permanent" and averts the risk of irritation to the client's scalp from thioglycolate residues.

Now, Mrs. John Q. Public does not care a hoot about the theory of thioglycolate waving. But her reaction to the fact that under skillful hands a softer, more permanent wave was produced with the new cold treatment was terrific. Beauty parlors vied with each other to be the first in a neighborhood or city to offer the cold wave, and today there is scarcely a leading establishment in the country that does not feature the new process. Over 150 brands of cold waving solutions are now on the market, according to a recent estimate.

Cold waving kits for home use have also been marketed. In these the waving solution is usually a solution of only 3.5 to 4 per cent ammonium thioglycolate. The user is directed to keep it in contact with the hair for one or more hours before setting as compared with 15 to 30 minutes in the beauty parlor.

Thioglycolate solutions can attack the protein of the skin as well as the hair. Beauty parlor operators are cautioned by practically every leading distributor of such waving solutions to wear rubber gloves at all times when giving treatments.

TEXTILES

The proteins of wool can also be attacked by alkaline thioglycolate solutions to produce modified wools with improved dye-taking properties. The number of cystine linkages broken can be regulated by time of exposure, concentration of thioglycolate, and pH. If a thioglycolate-softened wool is treated with methylene bromide or any other α, ω-dihaloalkane, an alkyl bridge is formed between the various sulfur units of the original proteins. Such alkyl-treated wools are resistant to attack by moths and beetles and have desirable shrink-proof characteristics.[23]

At the original price of over $7.00 per lb. textile manufacturers saw no hope of practical application of this method. At the current prices of $2.00 per lb., renewed interest has been manifest.

THERAPEUTIC USES

Minor quantities of thioglycolic acid are used in the preparation of pharmaceutical products. Chief among these are Parke Davis' Thiobismol (sodium bismuth thioglycolate) and Hynson, Westcott and Dunning's Antimony Thioglycolamide and Antimony Sodium Thioglycolate, all three of which have been accepted by the American Medical Association Council of Pharmacy and Chemistry for over 10 years. Ampules of the antimony sodium thioglycolate will be admitted to the next edition of National Formulary. The bismuth salt is used for syphilis and the antimony salt for granuloma venereum.

In France and other European countries, a gold derivative, calcium aurothioglycolate ("Myoral"), is used for the treatment of arthritis. In England, Watford Chemical Company, Ltd., has recently introduced "Deladrin", a thioglycolic acid salt of epinephrine which is said to give a prolonged stimulation of the sympathetic nervous system.

MISCELLANEOUS

Thioglycolic acid is a very sensitive reagent for detection of iron. Less than 0.005% iron will give a distinct pink color to a solution of ammonium thioglycolate. Quantitative methods have been developed,[25,26] but have never been widely employed because of the superiority of methods employing orthophenanthroline, α, α'-bipyridyl or sodium catechol disulfonate. In Germany the β-naphthylanilide of thioglycolic acid has been used as an analytical reagent for heavy metals.[27] The reagent was distributed by Schering-Kahlbann as Thionalid. Thioglycolic acid, or its amide, has also been used to detect double bonds,[28] peroxides,[29] nitriles,[30] and arsinic acids.[31] The Brewer medium for culturing anaerobic bacteria under aerobic conditions, now routinely used in all bacteriological laboratories, contains 0.1% sodium thioglycolate.[32, 33, 34]

Considerable experimentation is believed to be under way on the use of thioglycolic acid in petroleum and rubber technology, but trade secrecy has kept any quotable facts from being published.

Other suggested uses for thioglycolic acid have been in the synthesis of dyestuffs, in the modification of lignin or perfumes, detoxification of pharmaceutical arsenical preparations, and in the synthesis of biotin and its derivatives.

REFERENCES

1. Carius, Ann. *43*:57, 1862.
2. Klason and Carlson, Ber. *39*:733, 1906.
3. Schutz, Z. Angew. Chem. *46*:780, 1933.
4. NOTE: An excellent masking preparation has been devised by Aromatics Division, General Drug Company, 125 Barclay Street, New York City.
5. Klason, Ber. *14*:410, 1881.
6. Loven, Ber. *27*:304, 1894.
7. Friedlander and Chwala, Ber. *39*:1066.

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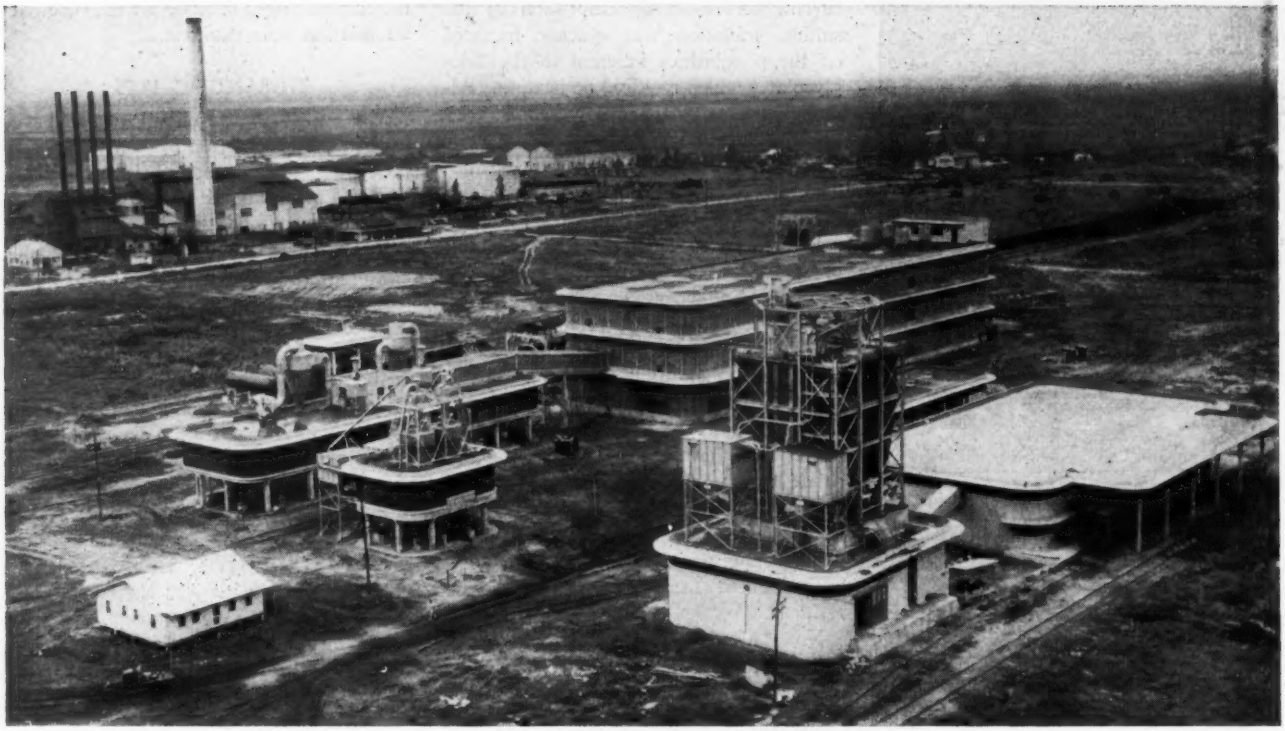


The new Clewiston starch plant consists of five buildings. Largest is the "wet" building, where main processing occurs. Connected to it is the dryer building, in front of which is the pulverizer building. Storage bins are atop the scale building behind which is the warehouse.

President C. R. Bitting compares a 1½-lb. ordinary yam with a 7½-lb. starch potato. The latter are starchier and sometimes attain 18 lb.

SWEET POTATO STARCH Becomes a Domestic Industry

EDITORIAL STAFF REPORT

ALTHOUGH ROOT STARCHES ACCOUNT for almost a third of our starch consumption, practically all domestic production has been of the cereal type, mainly cornstarch. Utilizing the unique advantages of the Florida Everglades, the United States Sugar Corporation's new plant at Clewiston, Florida, will now produce close to 40,000 tons of sweet potato starch annually.

LOCATED in the heart of a rich agricultural region, the new $7,000,000 starch house of the United States Sugar Corp. at Clewiston, Florida, will utilize the sweet potato production from 12,000 or more acres of land and will provide employment for 2,500 persons.

The new enterprise started operations on February 3, but full production will not be reached until next fall, when a new crop will be ready to replace that lost in the hurricane last September.

WHY SWEET POTATOES?

Starch and its derivatives are used in many diverse industries—from textile sizing to candy manufacture. Although the empirical formula for all starches is the same, the source of the material determines special characteristics, and it is these characteristics which mark the best starch for a particular use.

Starches are broadly classified in two categories: cereal and root. The former, obtained mainly from corn, rice, and wheat, differ considerably in their properties from those obtained from roots and tubers, such as sweet potato, arrowroot, white potato, and tapioca. While the qualities of the cereal starches are desirable for some uses, they are undesirable in other applications which call for root starches.

The consumption of root starches in this country is almost half that of the cereal starches. By far the greater part of our production, however, is in the form of cornstarch; and large quantities of the various root starches have consequently been imported. White potato starch is produced in Maine and New Brunswick from surplus and cull material, and a sweet potato starch plant operated at Laurel, Miss., from 1933 until this year. The plant produced a high grade starch which found a ready market in cotton mills, laundries, dextrin manufacture, and some food industries; but ceiling prices coupled with a heavy military demand at higher prices for dehydrated sweet potatoes have forced a temporary cessation of the operations.

The Clewiston plant will utilize a specially developed potato which is heavier and of higher starch content than the ordinary, edible yam. These potatoes weigh as much as 18 pounds, compared with the 1½ pounds of the edible variety. Yields are between 500 and 700 bushels per acre,

and experiments indicate that these may be increased.

Furthermore, the loamy soil and the semitropical climate of the Everglades is particularly adapted to growing the sweet potato. Bean farmers, for example, will be able to grow a crop of the starch potatoes in addition to their regular truck crop. Also, the potatoes will provide a substitute crop for cotton in crop rotation, and on the other hand the cotton mills will provide a convenient market for a portion of the finished starch.

The starch facilities, while they are an independent unit, are tied in with the corporation's sugar plant at Clewiston. This affords a more economical use of steam and electric power.

POTATO PROCESSING

The starch house consists of five buildings, isolating the operations of processing, drying, pulverizing, weighing, and storing to reduce fire and explosion hazards. Rust Engineering Co., of Pittsburgh, designed and supervised the construction of the facilities.

The potatoes are loaded at plantation sidings into specially constructed standard-gauge railroad cars, which pass over a track scale for weighing as they enter the starch house. Here they move to an electrically operated tilting-table where the car is tipped partly on its side, emptying the contents into a soaking pit. Provision is also made for receiving truckloads of potatoes.

The roots remain in the soaking pit for half an hour to loosen adhering soil and other foreign matter. They are then conveyed in turn to tumbling washers and brush washers, whence they are elevated to storage bins.

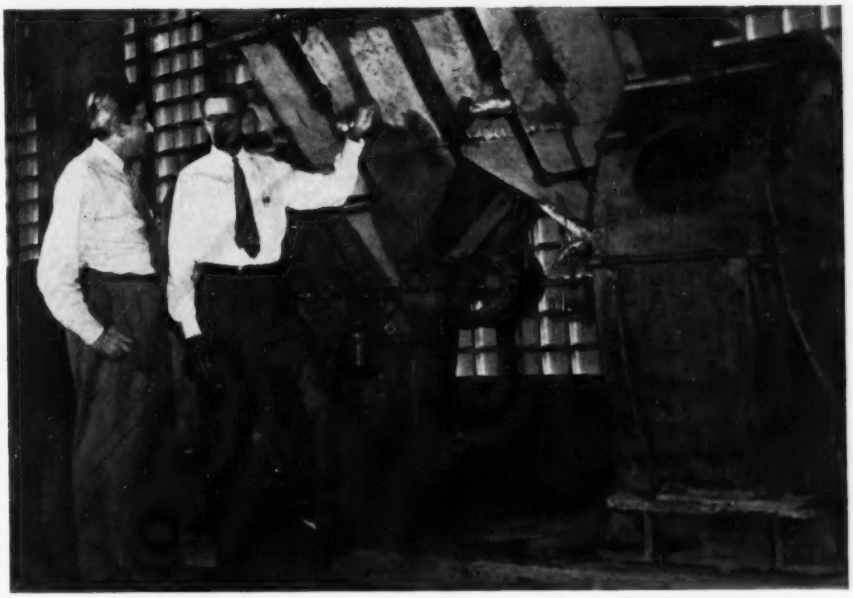
From the storage bins the roots are passed to cossetting—or slicing—machines, and then to attrition grinders which rupture the fibrous, starch-containing cells.

SEPARATION OF STARCH

The ground pulp now goes to "classifiers," low-speed centrifuges which remove the natural water contained in the pulp, and on to the vibrating screens, through which pass approximately three-quarters of the recoverable starch in the form of "milk." The pulp and starch which do not pass through the primary screens are conveyed to a battery of secondary grinders for further disintegration and thence to intermediate screens, where the solids are washed with lime water. The starch milk passing through these screens is returned to the primary grinders for dilution of the mass and is eventually recovered at the primary vibrating screens.

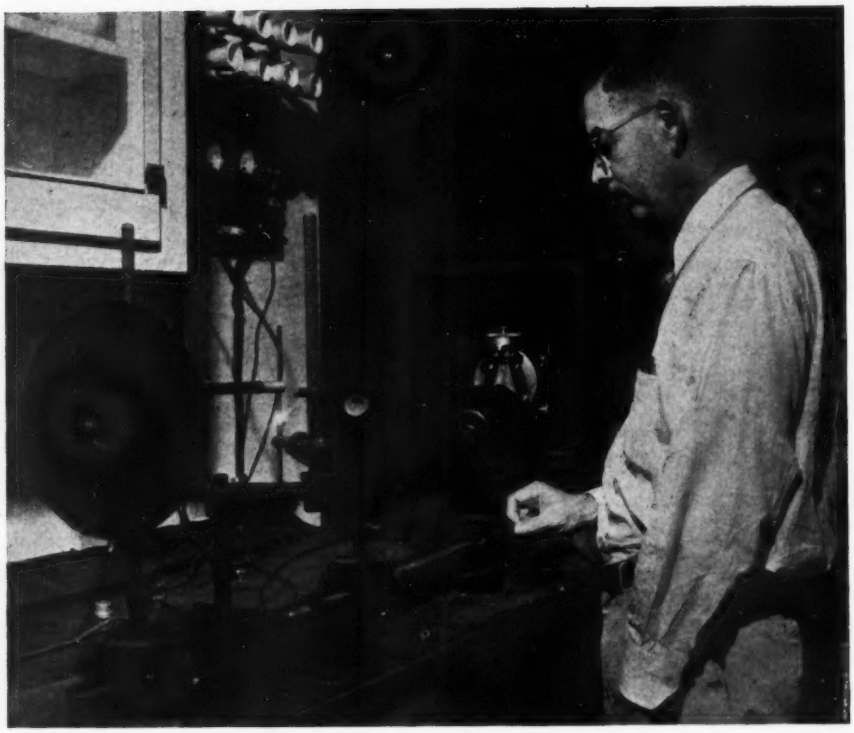
The solids which do not pass through the intermediate screens are conveyed to a dewatering station, then to pulp presses for further removal of moisture, and from there to pulp dryers and thence to storage bins. It is eventually bagged

Potatoes are harvested on one of the plantations. The loads will be transferred to special railroad cars which dump the contents into a soaking pit to remove adhering soil.



H. T. Vaughn, vice-president, and N. V. S. Mumford, superintendent, discuss operation of the cossetting machine, where the potatoes are sliced after a thorough scrubbing.

After slicing and grinding, water is separated from the potatoes in low-speed centrifugals. The pulp then passes over vibrating screens through which passes the starch "milk."



B. A. Bourne, vice-president in charge of research, operates a spectroscope. Starch samples are continuously withdrawn at every station for immediate analysis in the laboratory.

in the scale house and sold as stock feed.

The starch milk is conveyed to high-speed centrifuges for thickening and purifying after which it is bleached with sodium hypochlorite. At this point the starch may be modified by treatment with caustic soda or hydrochloric acid to change its properties in accordance with trade specifications. After bleaching or modification the starch milk is neutralized and partially dewatered on Oliver rotary vacuum filters. After filtration the starch is in the form of a cake containing approximately 45% moisture. The cake is further dewatered by centrifugation to a moisture content of 25%, and then dried in Hershey rotary steam dryers at atmospheric pressure to 10% moisture.

From the rotary dryers, which are housed in a separate building, the starch is conveyed to another building housing the pulverizers and separators where the product is prepared for passage through 200- or higher mesh screens. The pulverized starch may go directly to storage bins, or predetermined proportions of different types of starch may be blended before storage. The finished starch is conveyed by airveyors to the scale and bagging house where it is automatically weighed and bagged for shipment.

From the high-speed centrifugals, immediately following the primary screens, two lines of flow are maintained throughout the succeeding operations so that two distinct types of finished products may be produced.

CONTROL AND ANALYSIS

The plant is almost completely automatic. There are automatic controls for temperature of the starch from the bleaching tanks to the modification tanks or Oliver filters, and also for the temperature of the hot water for washing the screens and washing the starch in the Merco centrifuges. Steam pressure is automatically controlled in the dryers.

Sampling is both manual and automatic and in many instances continuous. Efficient methods of sampling have been set up to assure a thorough and complete check on material processing, as well as on wastes, and one important feature of sampling is the automatic devices for both collecting and measuring all waste waters.

Starch samples are collected every hour. An automatic tilt trough, which tilts back and forth through the starch stream, continuously collects samples in bottles which are examined hourly.

WATER TREATMENT AND WASTE DISPOSAL

Water used throughout the processing operations must conform to high standards of purity. Accordingly, a water treatment plant has been set up to provide the necessary quantities of treated water from Lake Okeechobee. The pumping station is located five miles out in the lake, and a 24-inch pipeline carries the water to the plant. Wash water is withdrawn for use without treatment, but the balance of the water is subjected to two or three treatment units, depending on its use.

The primary unit softens the water with lime and coagulates suspended material with alum. The secondary unit pro-

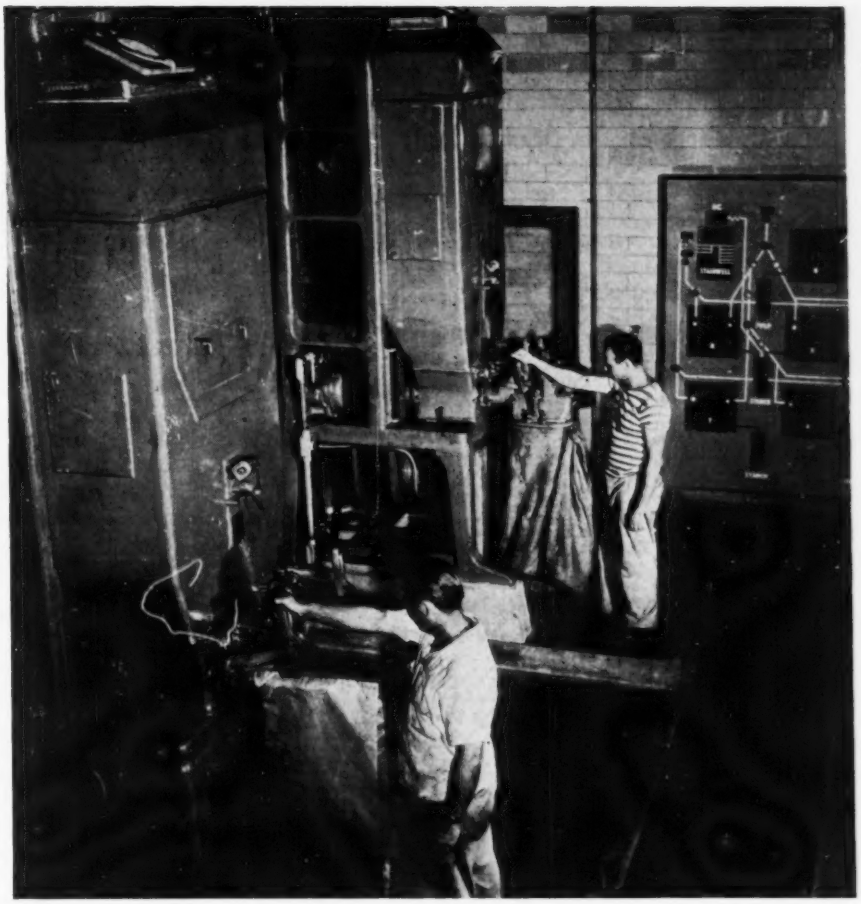
Starch milk from the screens is conveyed to these high speed centrifugals for thickening and purifying, after which it is bleached. After bleaching it is sometimes modified.

vides further softening with lime and soda ash, after which the water is passed through rapid sand filters. Boiler feed water undergoes further purification to remove calcium, silicon, and magnesium.

The water used for washing the potatoes is recycled after removal of the soil and loose vegetation. The settled solids are suspended in water and pumped to the fields to enrich the soil and the only additional water added is that needed to replace what is pumped away.

Disposal of the "fruit-waters," i.e., the water separated from the pulp and starch in the potato, and the other watery wastes produced during the extracting operations is more involved. Such waters contain a large proportion of organic matter which must be rendered harmless to avoid pollution. These wastes are passed through 8-mesh screens and the solid material ground up for rescreening. The fluid is then heated to 85° F. and maintained at that temperature for four days while mesophilic digestion takes place. Nitrogen is added to support fermentation. The fermentation produces almost a million cubic feet of gas per day which is piped to the power plant where it fuels the boilers about a third of the time. The liquid is further clarified, chlorinated, and returned to the lake, and the settled solids are pumped to the fields for soil enrichment.

Other wastes are the potato vines and the pulp remaining after starch separation. It has been mentioned that the latter, amounting in weight to 50% of the recovered starch, is bagged and used as stock feed. The vines themselves, equal in weight to the potatoes, have high nutritive value as forage.



Drying, pulverizing, and blending follow the bleaching operation. Then it is conveyed to the scale house where it is automatically weighed and bagged and moved to the warehouse.

INNOVATIONS

The process is essentially the same as that used at the Laurel, Miss., plant except that improvements have been made in most of the procedures with equipment suited to high-speed continuous production. An outstanding difference is the use of high-speed continuous centrifugals at Clewiston for purification of the starch rather than settling tables used at Laurel and other older plants. At Laurel only rotary washers are used to clean the potatoes, and the potatoes are hammermilled rather than sliced and attrited.

Two other ways in which the Clewiston operations differ from those at Laurel is in the use of horizontal continuous centrifugals and continuous vacuum filters. The former are used, as has been described, to separate the fruit waters from the ground roots, and the latter to wash the starch after purification. At Laurel solid basket centrifuges are used for washing and regular centrifuges for drying. Also, at Laurel drying is done under vacuum; at Clewiston the Hershey rotary steam dryers are used at atmospheric pressure. Many of the techniques were evolved in cooperation with the Laurel plant and the laboratories of the U. S. Department of Agriculture.

PLANS

After the 1946 crop is harvested and operations start in earnest, the corporation expects to produce about $5,000,000 worth of products a year, the bulk of which will be represented by finished starch. The latter will be distributed under the trade-name "Tubioca" through Morningstar, Nicol, Inc., exclusive sales agents for the starch products.

The starch project represents a substantial part of the corporation's $20,000,000 diversification program, designed to take advantage of the agricultural richness of the Everglades in providing, as far as possible, year-round employment for the workers.

WOOD UTILIZATION IN GERMANY

UTILIZATION of the sugars in sulfite waste for alcohol production has been practiced in all German mills since World War I, although the economics are understood to be unfavorable. The development of the technology for yeast production when required by the use of beech is an important advance in recent years, and this industry may possibly survive under normal conditions. Further, the technology developed may find some application in American mills.

Except in the fermentation and growth of yeast on the wood sugar solutions, American development of the Scholler process for alcohol from wood is out in front.

Although the Scholler process was not greatly expanded in Germany during the war—contrary to widely published reports—plants producing alcohol by this method and from sulfite liquor had capacities respectively totaling 10,000,000 and 25,000,000 liters per year. Total annual plant capacity for production of yeast from wood sugar was in excess of 25,000 metric tons. Additional plants for production of yeast from sufite liquor were under construction at the end of the war.

There has been no significant progress in the technique of sugar production; but at the Holzminden plant a fermentation with Torula of wood sugar to alcohol is carried out by a rapid, continuous yeast re-use method requiring as little as five hours. The two Bergius wood sugar plants had not changed their prewar techniques.

Still bottoms from one Scholler plant in Germany, one in Switzerland, and from a Swiss sulfite liquor alcohol plant are processed to produce yeast, which is of interest in reducing stream pollution.

THE MASS SPECTROMETER

A Flexible Tool for Industrial Analysis and Research

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Gulf Research & Development Company
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USE OF the mass spectrometer is increasing rapidly in spite of its high initial cost. Because of its unique ability to sort out materials of differing molecular weights, the spectrometer is being used as a leak detector, for the analysis of mixtures of chemical compounds, and for the preparation of U-235 on the Manhattan Project.

THE MASS SPECTROMETER is an instrument that has made its entry into industrial laboratories only within the last few years. At the present time there are quite a number of such devices installed and operating. Other than its use on the Manhattan Project for the preparation of U-235, this instrument is used chiefly for analyses of mixtures of chemical compounds and for research and development work.

HOW IT WORKS

The mass spectrometer may be regarded as a large electronic tube furnishing certain information about the variable atmosphere which it holds. The sample which is usually in the vapor phase is introduced into the tube by means of a small gas leak, where the gas molecules are subjected to bombardment by electrons of controlled energies. These electrons, upon impact with the molecules, break them up into fragments and ionize some of these fragments, which are then sorted out according to the masses. Different compounds yield different intensities of the various ions, furnishing the differentiation necessary for analytical work.

One of the most important parts of the mass spectrometer is the ion source where the electrons traveling at high speed create the ions by impact. Fig. 1 is a schematic diagram of an ion source showing the principal parts and their functional relationship. This consists of a vacuum tight envelope with a gas inlet connection and a vacuum pump connection. The filament F usually is of tungsten which, when incandescent, emits electrons. These electrons are drawn towards electrode A by virtue of a voltage difference between F and A. Some of them will pass through the hole in A into the region between B and A. The electrons passing through this region encounter the gas molecules present and create ions by impact which are drawn down to A due to a voltage difference between B and A. Some of them pass through the slit in A into the region between A and C. Here they are further accelerated by the voltage difference between A and C and some of them pass through the slit in C to form a ribbon of ions I. This ribbon-like stream of ions will contain all varieties created in the source and it passes on to the magnetic analyzer which will be described later. The electrons that continue through the region between B and A pass through a second hole in A and strike electrode D where they are trapped by a suitable applied voltage. External circuits incorporating some of the recent advances in the art of electronics, supply the necessary voltages. This electronic equipment is designed for great stability of electrical voltages and currents as this is of primary importance for successful use of the instrument. The interiors of the ion source and of the magnetic analyzer are maintained under a high vacuum. Usually a somewhat higher pressure in the ion source than in the analyzer is achieved by the manner of introducing the gas and by the location of the vacuum connections.

The geometrical disposition of the ion source, the magnetic analyzer and the ion collector may be seen in Fig. 2. In this figure, which is somewhat exaggerated, a diverging beam of ions leaving the ion source may be seen progressing towards the magnetic field which is perpendicular to the plane of the figure. The effect of the magnetic analyzer is to allow only ions of one mass to pass through the entire field to the collector. Here S represents the ions that proceed to the collector; R, ions of a smaller mass; and T, those of a larger mass. The particular mass that is allowed to reach the collector may be controlled by means of the voltages in the ion source or the strength of the magnetic field. The ions that go to the

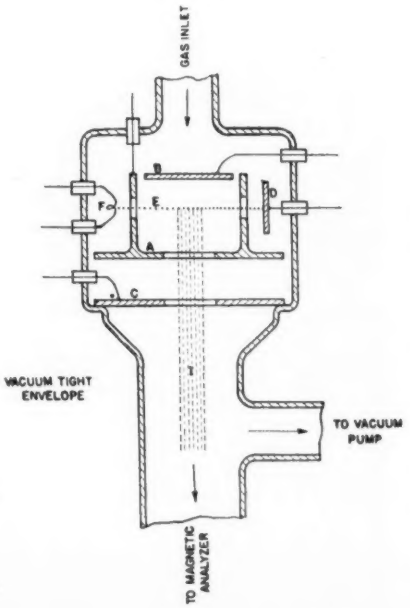


Fig. 1. Schematic diagram of mass spectrometer ion source.

The author is endebted to Mr. Nathan F. Kerr for obtaining and tabulating some of the data used and to Dr. Paul D. Foote, Executive Vice-president of Gulf Research and Development Co. for permission to publish this material.

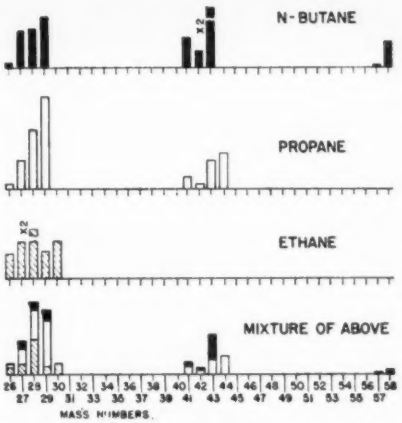


Fig. 3. Histogram representing relative ion yields from simple hydrocarbons and from a mixture of these hydrocarbons.

collector create a small electrical signal by virtue of their charge, which is amplified by suitable electronic circuits. Since the instrument can separate and measure the intensities of the ion beams for ions of different masses it is called a mass spectrometer. The magnetic focusing scheme shown in Fig. 2 is called the sector type. Other types of focusing exist although the overall function in each case is the same. For further details other papers should be consulted.

Although not indicated in Fig. 2, a vacuum tight envelope encompasses the ion source, the region of their travel in the magnetic analyzer, and the ion collector. The pressure in this must be of the order of 10^{-6} mm. of Hg. Such systems are continuously evacuated by diffusion pumps.

As previously noted, a molecule may be dissociated into a number of different types of ions when it collides with an electron. For example, n-butane, which has a molecular weight of 58 may yield ions of mass (in atomic mass units) 58, 57, 56, 55, 43, 42, etc. The first of these corresponds to the parent molecule losing an electron whereas, the others correspond to the parent atom losing one, two, or three hydrogen atoms, three hydrogen atoms plus a carbon atom, etc.

Fig. 3 is a histogram showing the yields of ions of various masses found for the three compounds n-butane, propane and ethane, and a mixture of the three. Due to the shape of the curve obtained when the signal representing ion current is plotted as a function of the voltages varied to bring the beam into focus, the terminology "ion peak" has become rather wide spread. The existence of an ion peak for a certain mass is equivalent to saying that ions of that mass are obtained. In Fig. 3, for example, we see that there are ion peaks for masses up to 58 for n-butane while propane does not yield ions of mass above 44 and ethane does not yield them above 30. There are additional small peaks due to isotopes which are not shown.

As different compounds vary in molecular structure their ion yields will be unlike in mass and in intensity. When the mass spectra of two isomers such as n-butane and i-butane are compared the differences are in intensity alone. However, if two compounds are compared which do not have the same molecular weight the heavier will naturally yield certain ions that the lighter will not. This may be seen in Fig. 3 where propane does not have the higher mass peaks of n-butane. A similar result is noted for ethane. When a mixture of separate compounds is examined a mass spectrum is obtained which is a composite of the ion yields of the individual compounds present. The dissociation and ionization of one substance is not affected by the presence of another under the conditions used, making it possible to apply the instrument to problems of quantitative analysis. The mass spectrum of each compound in a pure state may be determined and this information used to calculate the percentages of the various constituents present when the spectrum for a mixture is obtained. For the details of this process the reader should consult other papers.[3, 4]

USE IN ANALYSIS

Because of the nature of the data obtained the mass spectrometer is the ideal instrument for certain types of analyses. Because of speed, accuracy and range of components handled it is excellent for analyses for process control. For example, the three-carbon hydrocarbon content in the absorber gas of a polyforming unit used in petroleum refining may be used for control of the process. The analyses of the absorber gas for C_3 content, which at the same time yields both the propane and propylene, may be completed in a routine manner in a time of about 25 minutes, including calculations. The percent differences between the concentrations as blended and as found are about 0.2% of total sample and a group of results illustrating this analysis may be seen in Table I. This shows the C_3 content of a number of synthetic samples as blended and as determined by the mass spectrometer. These samples were analyzed and calculated under the routine conditions used for the control work.

Table I. Results for analyses of blends of C_3 hydrocarbons and lighter. Δ% represents difference between actual and observed concentrations.

Blend No.	Component	Synthetic %	Observed %	Δ%
1	propane	3.93	4.01	+0.08
	propylene	2.89	3.06	+0.07
	total C_3's	6.82	7.07	+0.25
2	propane	2.64	2.46	−0.18
	propylene	1.84	1.89	+0.05
	total C_3's	4.48	4.35	−0.13
3	propane	1.92	2.12	+0.20
	propylene	1.03	1.14	+0.11
	total C_3's	2.95	3.26	+0.31
4	propane	0.60	0.39	−0.21
	propylene	4.16	4.41	+0.25
	total C_3's	4.76	4.80	+0.04
5	propane	1.64	1.58	−0.06
	propylene	0.54	0.71	+0.17
	total C_3's	2.18	2.29	+0.11

An analysis very similar to the one just described and also for process control is the analysis of a gas recycle stream in a polyforming process such as above. This gas may contain four-carbon hydrocarbons as well as lighter gases and the amount of the former found is of use for the control. The analysis for the C_4 content yields i-butane, n-butane, the butenes and butadiene, if desired. The complete analysis, including calculations, can be done in approximately thirty minutes. In this determination the butenes may be lumped together as their properties in the mass spectrometer are not widely different. Table II shows the C_4 content

Table II. Results for analyses of blends of C_4 hydrocarbons and lighter. Δ% represents difference between actual and observed concentrations.

Blend No.	Component	Synthetic %	Observed %	Δ%
1	i-butane	4.25	4.37	+0.12
	n-butane	0.00	0.00	0.00
	butenes	1.37	1.16	−0.21
	total C_4's	5.62	5.53	−0.09
2	i-butane	0.89	0.95	+0.06
	n-butane	1.02	0.95	−0.07
	butenes	1.49	1.70	+0.21
	total C_4's	3.40	3.60	+0.20
3	i-butane	3.20	2.36	+0.06
	n-butane	1.72	1.62	−0.10
	butenes	4.73	4.67	−0.06
	total C_4's	9.65	9.55	−0.10
4	i-butane	0.00	0.07	+0.07
	n-butane	0.56	0.61	+0.05
	butenes	0.98	0.94	−0.04
	total C_4's	1.54	1.62	+0.08
5	i-butane	2.81	2.94	+0.13
	n-butane	0.00	0.00	0.00
	butenes	2.52	2.34	−0.18
	total C_4's	5.33	5.28	−0.05

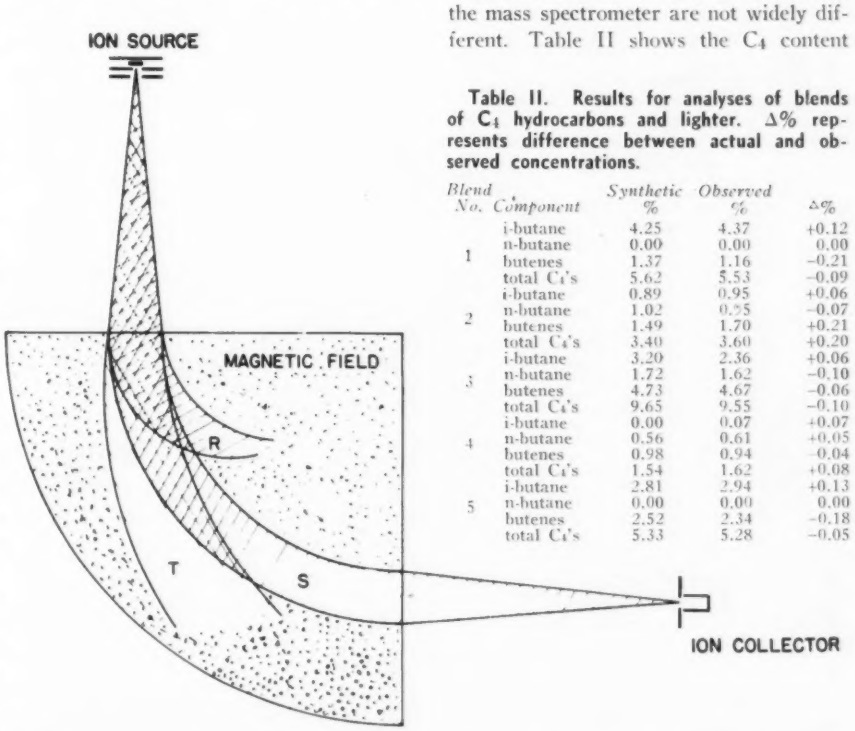


Fig. 2. Geometrical arrangement of ion source, magnetic field, and ion collector for sector type instrument.

of a number of synthetic samples as blended and as determined by routine analysis.

The two types of control analyses just described are examples of some of the simpler ones which can be done easily on night shifts. As the mass spectrometer is a quite complicated instrument, the period of training for any operator must necessarily be longer than for other types of equipment. Even with fully trained operators it is necessary to have a competent supervisor at hand to see that the routine of processing the samples is faithfully followed; that the calculations are carried out correctly; and to spot, diagnose and if possible correct any malfunctioning of the apparatus. Since the necessary data and calculations on the above two types of analyses are not as lengthy and involved as others to be described, they can be carried out in the absence of as much technical supervision. This is, of course, very desirable for night work.

In Table III, the data for a wet gas sample, which is from an article by Washburn, Wiley and Rock,[5] illustrate the range of components for which routine analyses can be made, the comparison between these results and ones from a fractionating column, and the total man hours needed. It is to be noted that this analysis covers compounds for molecular weights ranging from sixteen to over eighty-four. From Table IV it is also to be noted, that, although the total man hours needed for this analysis is given as 2¼ hours, the instrument time is only 25 minutes. A team working to keep the instrument in constant use and the calculations going simultaneously can thus analyze many different samples.

Table III. Analysis of wet gas.[5]

Compound	Mass Spectrometer Mole %	Fractionating Column Mole %
N_2	1.1	....
Methane	84.1	87.44
Ethane	4.9	4.60
Propane	4.7	4.30
Isobutane	1.1	0.72
n-Butane	1.7	1.47
Isopentane	0.7	0.55
n-Pentane	0.5	0.47
C_6+	0.2	0.45
C_4 naphthenes	0.6	...
C_5 naphthenes	0.3	...
C_6 naphthenes	0.1	...

Table IV. Time Required for Analysis by Complete Direct Method.

	Minutes
Mass spectrometer (instrument time)	
Mixture	25
Prorated calibration	4
Taking data from record (technician's time)	
Mixture	20
Prorated calibration	4
Computing	80
Total man-hours	2.25

An example of an analysis of a mixture of greater average molecular weight than previously discussed and which would be normally liquid at room temperature is to be seen in Table V. The data of this table are also taken from Washburn, Wiley and Rock.[5] Any material that is to be examined mass spectrometically in a routine manner must be in the vapor phase while in the ion source. This means then that such a sample as this must be vaporized. To avoid any errors due to differences in boiling point it is important that a small portion of the liquid sample, of the order of ½ ml. or less, be completely vaporized. Table V illustrates not only the comparison between the instrument analyses and the synthetic compositions, but also illustrates the day to day reproducibility. On both counts the error is only a few tenths per cent of total sample. From Table VI it is seen that the instrument time is quite small, i.e., 25 minutes, for such a complicated analysis.

Table V. Two C_6 mixtures analyzed by the mass spectrometer method[5] on two successive days. Composition from synthesis is given for comparison.

	Synthetic	Mass Spectrometer 6-25	Mass Spectrometer 6-26	Synthetic	Mass Spectrometer 6-25	Mass Spectrometer 6-26
	Mole per cent			Mole per cent		
2,2-Dimethylbutane	3.82	3.5	3.5	26.40	26.1	25.9
Cyclopentane	0	0	0	0	0	0
2,3-Dimethylbutane	0	0	0.3	0	0.5	0.2
2-Methylpentane	12.03	12.5	12.3	36.24	35.7	36.4
3-Methylpentane	6.16	6.8	1.3	20.26	20.8	20.6
n-Hexane	77.99	77.2	76.6	17.10	16.9	16.9

Table VI. Time Required for Analysis by Complete Direct Method

	Minutes
Mass spectrometer (instrument time)	
Mixture	25
Prorated calibration	12
Taking data from record (technician's time)	
Mixture	25
Prorated calibration	12
Computing	120
Total man-hours	3.25

The restrictions named above, that the material to be studied must be in the gas phase in the ion source, does not entirely rule out the examination of solids. It does, however, necessitate that the material be inserted in a furnace or on a heated disk within the source so that it may be vaporized. This procedure has been followed in research studies where the isotopic concentration of the elements was being studied.[1, 6]

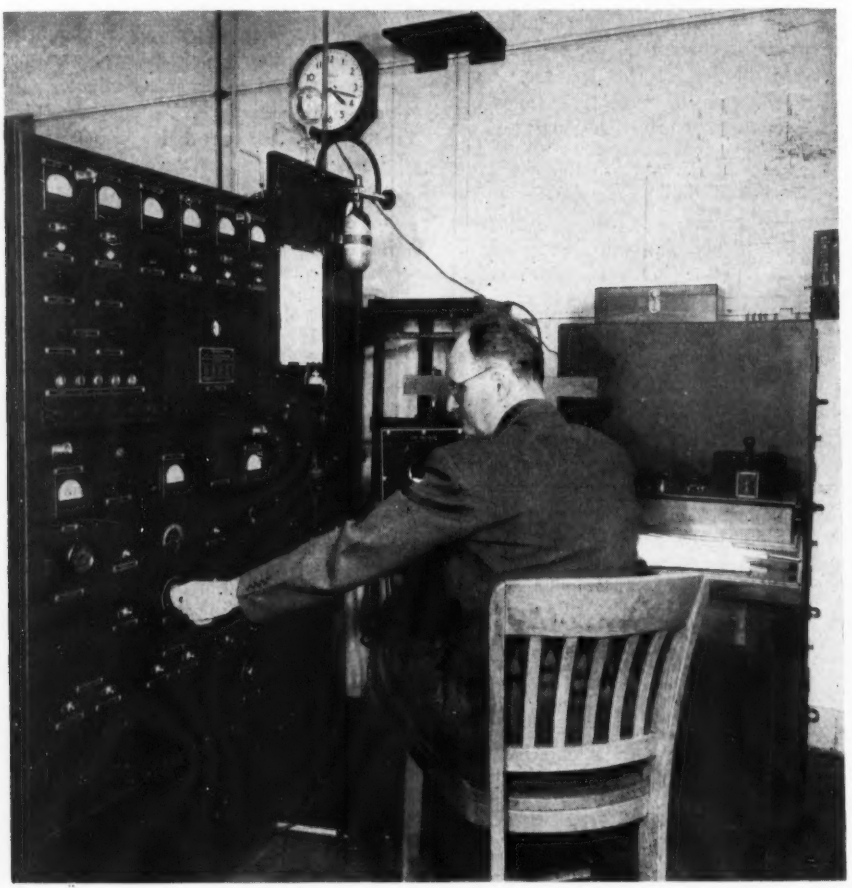


Fig. 4. Westinghouse Electric Corp. mass spectrometer as set up for manual operation and as used by Gulf Research and Development Co.

RESEARCH APPLICATIONS

By virtue of the peculiar type of data it supplies, namely the intensity and mass of the ion fragments, the mass spectrometer is particularly suited to certain research applications. One of growing importance is the studying of chemical reactions by means of isotopic tracers. Practically all of the elements in the periodic table consist of two or more isotopes, which are merely atoms having the same chemical properties but different masses. Hydrogen consists of the ordinary isotope of atomic mass one and the rare one, deuterium of mass two. Carbon consists

of the ordinary isotope of mass twelve and another one of mass thirteen which is found to the extent of about 1% of the former. Modern methods now permit separation of appreciable quantities of the rare ones. Deuterium is perhaps the easiest to separate and is now available commercially.

If a molecule contains a heavy isotope, for example, an iso-butane molecule may contain three normal carbon atoms of mass twelve each and one carbon isotope of mass thirteen, its molecular weight will be one unit higher than normal. Actually these heavier molecules are detected for all hydrocarbons and other compounds and their intensities depend upon the abundance of the various isotopes involved. In Fig. 3 the peaks for molecular ions containing heavy isotopes were not shown as they are small. If a compound is synthesized from a sample of carbon in which the abundance of the isotope of mass thirteen has been increased over that found in nature, the distribution of ion peak intensities will be different than for the naturally occurring compound. This allows the compound to be tagged for tracer work. Considerable application of the technique has been made to biochemical problems.[7] Rittenberg has used nitrogen enriched in the rare isotope of atomic weight 15 to synthesize amino acids. These tagged amino acids could then be followed through certain digestive and other biochemical changes. For exploring and settling certain problems of chemical reactions and catalysis this technique offers a powerful tool that is just beginning to be fully utilized.

For following or studying chemical reactions directly this instrument has been successfully used by Urey and his coworkers, Eltenton and others. In Eltenton's work he used the mass spectrometer to detect free radicals from a thermal reaction chamber in which were placed lead tetramethyl and different hydrocarbons.[8] Leifer and Urey[9] used the instrument to study the thermal decomposition of dimethyl ether and of acetaldehyde. In this work the intermediates and reaction products entered the ion source through a capillary leak which intruded into the reaction chamber. This is another type of application of this instrument which up to date has not been widely used but which, because of the singular type of data it can furnish, will play an increasingly important role in chemical research of a fundamental nature.

As was discussed above, when a molecule suffers impact by an electron any one of a number of ionized fragments is possible. By adjusting the energy of the electrons it is possible to create only certain classes of these ions. For example, it requires electrons of a definite minimum energy to tear a hydrogen atom off of a n-butane molecule and ionize the remainder. This minimum energy can be found experimentally with the mass spectrometer. To tear off a complete methyl radical from the same molecule and ionize the remainder requires a different minimum energy which can also be determined. The experimental determination of the energies and the correct correlation with the collision process giving rise to the ions allows a deduction of molecular bond strengths. Much work of an academic nature has been done along these lines and the results have furnished data of value for clarifying certain problems of molecular structure.[10]

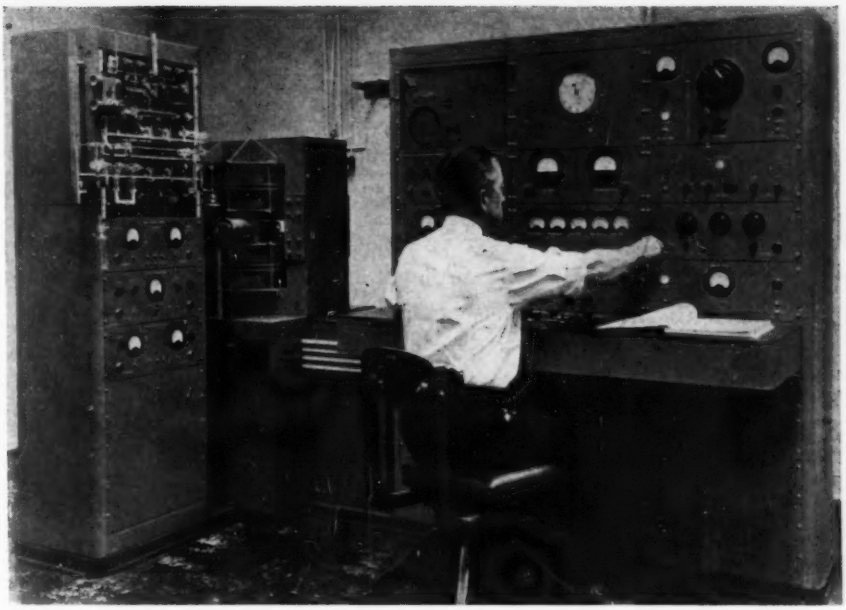


Fig. 5. Consolidated Engineering Corp. mass spectrometer complete with automatic recording equipment.

According to Smyth[11] a mass spectrometric method of separation ". . . was the first to produce large amounts of the separated isotopes of uranium."[12] "The electromagnetic separation plant was in large scale operation during the winter of 1944-1945 and produced U-235 of sufficient purity for use in atomic bombs."[13]

COST

A number of large companies have hired physicists to build mass spectrometers for such uses as outlined above. At the present time this practice is not necessary in view of the commercial availability of suitable instruments.[14] The instrument itself is quite complex and embodies a number of physical phenomena not as yet completely understood. Unless an instrument of special design is needed it is usually of greater utility for the available highly trained personnel to concentrate on the application and adaptation of the available instruments to the company's own problems. To establish a mass spectrometry laboratory with automatic recording, a company must be prepared to appropriate $20,000-$30,000.

(The development of a mass spectrometer capable of detecting a leak allowing passage of only one cubic centimeter of helium at atmospheric pressure in 16 years is announced on page 413 in this issue. EDITORS.)

BIBLIOGRAPHY

1. Coggeshall and Hipple. "The Mass Spectrometer and Its Applications," Vol. VI of Colloid Chemistry series, edited by Jerome Alexander, Rheinhold Publishing Co., New York, 1946.
2. Jordan and Young, J. of App. Phys. *13*, 526 (1942).
3. Hoover and Washburn, Calif. Oil World, *34*, No. 22, 21-2 (Nov. 1941).
4. John Hipple, J. of App. Phys., *13*, 551 (1942).
5. Washburn, Wiley and Rock, Anal. Ed., Ind. & Eng. Chem., *15*, 541 (1943).
6. K. L. Cook, Phys. Rev., *64*, 278 (1943).
7. D. Rittenberg, J. of App. Phys., *13*, 561 (1942).
8. Eltenton, J. Chem. Phys., *10*, 403 (1942).
9. Leifer and Urey, J.A.C.S., *64*, 994 (1942).
10. Smyth, Rev. Mod. Physics, *3*, 347 (1931).
11. Smyth, H. D. A General Account of the Development of Methods of Using Atomic Energy for Military Purposes under the Auspices of the United States Goveernment 1940-1945.
12. ibid. Chapter 11, paragraph 48.
13. ibid. Chapter 11, paragraph 42.

Thioglycolic Acid

(*Continued from page 415*)

8. Holmberg and Mattison, Ann. *353*:124.
9. Gunsburg and Bondzynski Ber. *19*:117.
10. Larsson, Z. Anorg. Chem. *172*:379.
11. Larsson, Ber. *61*:1440, 1928.
12. Friedlander and Chwala, Monat. *28*:250.
13. Andreasch, Monat. *8*:424.
14. Andreasch, Ber. *12*:1390, 1879.
15. Klason and Carlson, Ber. *39*:732, 1906.
16. Cannan and Knight, Biochem. J. *21*:1384, 1927.
17. Larsson, Z. Anorg. Chem. *172*:380.
18. U. S. Patent No. 1,973,130, Sept. 14, 1934; H. G. Turley and W. Windus, assigned to Rohm & Haas.
19. Fletcher, French patent No. 824,804, Feb. 17, 1938.
20. K. Boheman, British patent, No. 484,467, April 27, 1938.
21. Evans and McDonough, French patent No. 844,629, July 26, 1939.
22. Hoshall, J.A.O.A.C. *33*:727, 1940.
23. U. S. Dept. Agriculture, National Bureau of Standards, Research Papers Nos. 1405 and 1506, M. L. Harris.
24. U. S. Patent No. 1,517,002, 1924.
25. Lyons, J. Am. Chem. Soc. *49*:916, 1927.
26. Lobell and Ellis, Ind. Eng. Chem. Anal. Ed. *6*:646, 1934.
27. Axberg, Ber. *66B*:403, 1935.
28. Axberg and Holmberg, Ber. *66B*:1193, 1933.
29. Schales, Ber. *71B*:447, 1938.
30. Condo et al., J. Am. Chem. Soc. *59*:230, 1937.
31. Barber, J. Am. Chem. Soc. *51*:1022, 1929.
32. Brewer, J. Bact. *39*:10, 1940.
33. Brewer, J. Bact. *47*:455, 1944.
34. Brewer, Proc. Soc. Exper. Biol. & Med. *42*:572, 1940.

HYDRAZINE HYDRATE

War Baby or New Chemical Intermediate?

HYDRAZINE HYDRATE has been brought before the public eye because of its use in the second step in the launching of the German V-2 rocket. The following description of the first German plant for its production will aid in the proper evaluation of the place of this intermediate in the American economy.

HYDRAZINE HYDRATE, although deriving its prominence principally from the German proposal for its use in rocket propulsion, is now being prepared commercially in the United States with the same basic process that was utilized in Germany, namely, reaction of an alkali hypochlorite with excess ammonia. It is now being used by American industry for the synthesis of dyestuffs, pharmaceuticals and as a reducing agent for the deposition of metals on essentially non-conducting surfaces.

According to the Chemical Warfare Service[1] hydrazine hydrate was used in the second of three steps involved in rocket propulsion. First, permanganate reacted with hydrogen peroxide, giving superheated steam which drove a turbine connected to pumps. The pumps delivered hydrogen peroxide and a hydrazine hydrate in methanol solution to the combustion chamber, where an instantaneous, strongly exothermic reaction occurred. When the reaction chamber became hot enough, the permanganate and peroxide shut off automatically and the rocket drive was taken over by an oxygen-alcohol combination.

GERMAN PRODUCTION

Production of hydrazine hydrate was started by the Germans[2] at the plant of IG Farbenindustrie A. G. at Leverkusen in April, 1944, when 20 tons were produced. This was increased to 40 to 45 tons per month and a total of 280 tons were produced in 1944. Only about 45 tons were produced in 1945 although the plant had a rated capacity of 60 tons of hydrazine hydrate per month. In addition to the plant at Leverkusen the German government financed a plant for production of 300 tons per month of hydrazine hydrate at Gersthofen. This plant operated first in October 1944 and produced only 50 tons and according to information at Leverkusen little more has been made since because of various troubles.

REACTION

According to information obtained at Leverkusen, it is possible to prepare hydrazine hydrate from alkali-hypochlorite and excess ammonia (an aqueous solution) in the presence of such materials as gelatin and glue, which raised the viscosity.

Raschig, who discovered the reaction, suggested the following overall equation:

$$NaOCl + 2NH_3 \longrightarrow NH_2\ NH_2 + NaCl + H_2O.$$

The first step of the reaction is:

$$NaOCl + NH_3 \longrightarrow NH_2Cl + (NaOH).$$

The second step:

$$NH_2Cl + NH_3 \longrightarrow NH_2\ NH_2 + (HCl)$$

The following undesirable side reaction appreciably diminishes the yield:

$$2NH_2Cl + NH_2\ NH_2 \longrightarrow 2NH_4Cl + N_2$$

It is possible to prepare hydrazine hydrate in good yield without the addition of glue if the chloramine solution, which is the product of the first step of the reaction, is heated with excess ammonia under pressure at a temperature of 150-200° C. and if the process is carried out as rapidly as possible. Pure chloramine solutions are not required but solutions containing sodium hypochlorite and ammonia (for the formation of chloramine) may be employed. The pressure tube in which the reaction is carried out may have very small dimensions as, under the indicated conditions, reaction is complete in a few seconds, if the reaction mix can be brought up to temperature fast enough. Following the reaction, a reduction in pressure of the solution allows the greater part of the excess ammonia to escape; the heat required to raise the temperature of the mixture to the boiling point being almost completely supplied by the heat of reaction. The remaining ammonia is driven off in another column, vaporization being so regulated that an ammonia solution results from a cooling of the effluent ammonia and water vapor and from the ammonia resulting from release of pressure on the solution, which can be directly used again in the reaction. This produces a crude hydrazine hydrate solution (concentration about 3 per cent). The yield (based on the active chlorine in the sodium hypochlorite solution) is 70-75 per cent.

The presence of heavy metal impurities has an especially bad effect on the yield; this is particularly true of copper and the ammonia solution must be continually tested for its copper content. In case the sodium hypochlorite solution contains large amounts of iron, it is advisable to filter after dilution. The crude hydrazine hydrate solution contains 5-6 per cent sodium chloride and some sodium hydroxide and cannot be directly concentrated as these materials must first be removed. This is usually carried out in a salt evaporator from which the resulting 6-8 per cent hydrazine hydrate-water vapor mixture is driven over into a fractionating column.

The pure dilute hydrazine hydrate solution from the fractionating column is concentrated in two distillation columns. In the first column a concentration of 40-50 per cent is obtained; the second giving a concentration of 95-98 per cent. The second distillation must be carried out under a nitrogen atmosphere to avoid the possibility of explosion.

FLOW CHART

In the plant at Leverkusen the sodium hypochlorite solution, containing 12.7 per cent active chlorine, 0.4 g. alkali per liter, is adjusted to a concentration of about 70 g. of active chlorine per liter in container (0.1) by using water purified by ion exchange from another container (No. 2).

The ammonia solution is adjusted to a concentration of about 20-25 per cent (sp. gr. 0.910). Both solutions flow through measuring meters and then to a high pressure pump (No. 6), which is provided with mixing ducts. The inward flow of each solution is so adjusted that the ratio of sodium hypochlorite to ammonia is 1-2. The pump brings the reaction mixture to a pressure of 40-50 atmospheres and drives it into the reaction pressure tube (No. 7) which is heated to about 183° C. After the few seconds required in the reaction tube the pressure on the solution is reduced to atmospheric in the evaporation pot (No. 8). The resultant vapor and the residual liquid, in order to establish thermodynamic equilibrium, flow through a packed column (No. 9) which is connected from below to the evaporator pot (No. 8). The vapor, which is removed from below, is rectified in a second packed column (No. 10) by means of ammonia water, to avoid hydrazine losses. This solution plus the reflux in the second column (No. 10) then enters the separating column (No. 11), a circular tube evaporator (No. 12) being employed for the production of the vapors. A part of the heated vapor is obtained from the vaporization of the high-pressure condensate from the heater, the necessary amount of ammonia (as 100 per cent ammonia) being continuously introduced into the upper part of the separating column (No. 11), which is operated in such a way that the ammonia-water vapor mixture produced has the proper composition for use again in the process. This mixture is condensed in two tubular condensers (No. 13a and 13b) and flows back into the storage container (No. 5).

Note: Interested parties should realize that some products and processes described by the Publication Board report may also be the subject of U. S. patents. Accordingly it is recommended that the usual patent study be made before pursuing practical applications.

The ammonia-free crude hydrazine solution is collected in a storage container (No. 14).

As high concentration hydrazine attacks iron, it is essential that all subsequent apparatus be constructed of 18-8 chromium-nickel steel. First, sodium chloride and sodium hydroxide are removed from the crude solution in the salt evaporator (No. 15), which consists of a column with a circular tube evaporator (No. 15a) connected at the base of the column with a suction filter (No. 15b). The solution here is concentrated to the point where crystallization of sodium chloride begins; a hydrazine-water vapor mixture (8-12 per cent hydrazine) escapes, leaving a hydrazine hydrate concentration of 15-20 per cent (b. p. 112-114° C.) in the salt evaporator. Special attention must be devoted to the washing process in order to prevent large losses of hydrazine. The sodium chloride, which contains sodium hydroxide, is collected in the suction filter before its periodic removal.

The vapor mixture from the salt evaporator passes into the bottom of a packed fractionating column (No. 16), in the upper part of which a portion of the condensate is introduced as reflux. The purified 8 per cent hydrazine hydrate solution is pumped into a distillation column (No. 17) which contains a perforated plate in the middle section of the column, the lower part being filled with VA rings. The resultant product is a concentration of about 40-50 per cent.

The yield in the distillation based on the amount of crude solution employed, is 80-85 per cent. The sources of loss are:

a. Oxidation by air oxygen.
b. Loss during removal of sodium chloride.
c. Catalytic decomposition according to the equation:

$$3N_2H_4.H_2O \longrightarrow N_2 + 4NH_3 + 3H_2O.$$

d. Losses in run-off condensate.

SAFETY

Concentrated $NH_2NH_2.H_2O$ vapors are a little known blood poison; it is therefore necessary to take great pains to avoid leaks in the apparatus, and to provide good ventilation for the room in which the apparatus is located. Moreover, the solution and vapors of $NH_2NH_2.H_2O$ act as a skin-poison, depending somewhat on the individual and it is especially important to protect the eyes from spray or mist of the solution.

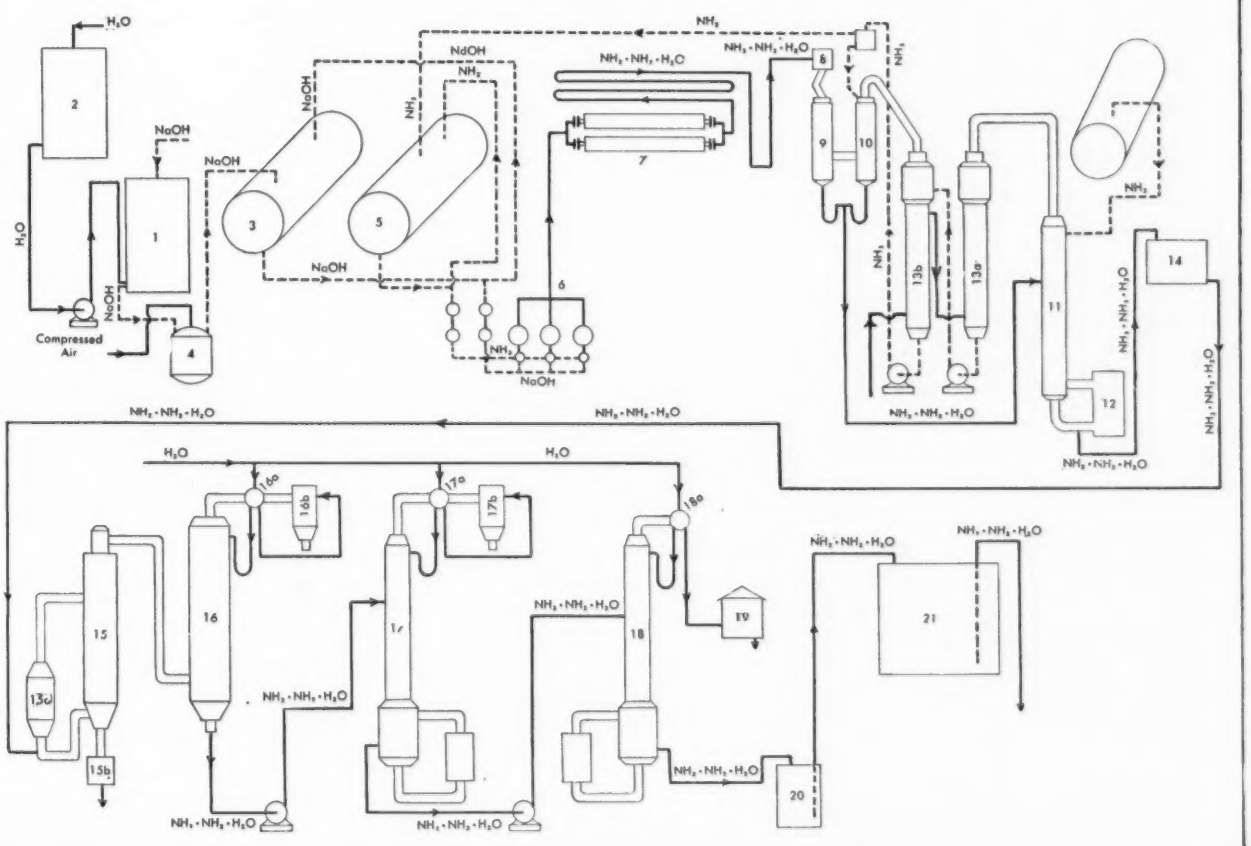
In the condensers (No. 17a and 17b), which are over the column, vaporized water is recondensed. A part of the condensate, which contains only traces of hydrazine hydrate, is led into the upper part of the column where it comes in contact with the rising vapor. The temperature in this step is about 108-110° C. The 40-50 per cent solution from this column is pumped into the second distillation column (No. 18), which, in principal, is just the same as the first column. Since hot hydrazine hydrate solution reacts explosively with oxygen all access of air to the product in the final step must be carefully avoided.

The column is connected through the condenser (No. 18a) to a nitrogen gasometer (No. 19) and must be carefully flushed out with nitrogen at the start of the operation or at any interruption of the process. In addition, in the upper part of the column an "explosion-damper" is provided, made of lead sheet 5 mms. thick. The boiling point of the resultant 95-98 per cent hydrazine hydrate solution is 119-120° C. The final concentrated solution runs out of the column continuously through an overflow tube into a measuring vessel (No. 20), provided with a cooler, and then is pumped into a third vessel (No. 21), lined with Mipolan (Polyvinyl resin).

BIBLIOGRAPHY

1. Chemical Industries, 42, 646 (1945).
2. Fogler, M. F. "Production of Hydrazine Hydrate I. G. Farben A. G., Leverkusen, Germany." Report No. 186, Office of the Publication Board, Department of Commerce.

PRODUCTION OF HYDRAZINE HYDRATE AT LEVERKUSEN



Rubber Industry Needs New Chemicals

M. J. DE FRANCE
The Goodyear Tire & Rubber Co., Akron, O.

THE HIGH QUALITY AND VERSATILITY of present-day rubber, both natural and synthetic, are largely the fruits of chemical research, which has developed plasticizers, antioxidents, accelerators, and the like of superior effectiveness. The work has been good, but the job is not yet complete. The rubber industry still needs better plasticizers, a good high temperature stabilizer, and other materials to extend rubber's usefulness.

THE RUBBER industry has chemical requirements which are now being met to a less satisfactory degree than desired.

It will be realized that a discussion of these needs is limited to the writer's knowledge of the present status of developments in these fields. Very often samples of new materials are submitted with sales descriptions colored by hopeful claims which, many times, cannot be substantiated. This practice is recognized as all a part of the game; however, if these remarks are to carry any weight at all, they will have to be construed as not being based upon this type of information. It is also recognized that, in the field of rubber, small differences in processing and in physical test results are not necessarily reproducible from one plant or laboratory to another. The discussion is, therefore, confined to differences of such magnitude as we believe to be observable in any trial.

The following classifications will be discussed individually:

1. Plasticizers
2. Chemical Plasticizing Agents
3. Solvents
4. Reclaiming Oils
5. Pigments
6. Accelerators
7. Antioxidants
8. Adhesives—Rubber to Metal

It will also be necessary to discuss each classification with respect to the basic rubber into which it is to be compounded. The same results cannot be expected from the same material when tried in natural rubber and in any one of the many varieties of synthetic rubbers. We will try to present a picture on each classification for natural rubber; GR-S synthetic rubber; Neoprene synthetic rubber; butyl, in some cases; and the butadiene acrylonitrile types of synthetic rubber such as Hycar, Butaprene, Perbunan and Chemigum.

PLASTICIZERS

Plasticizers for natural rubber or synthetic rubber compounds are generally added for one of the following four purposes:

1. To plasticize the uncured compounds for processing;
2. To produce tack in the uncured compounds.
3. To produce a lower cured hardness;
4. To produce an improved low temperature flexibility in the cured product.

No single plasticizer can be added to a compound for one of these purposes without having an effect, one way or another, on the other three and the combination of effects must be appraised in determining the value of any particular material.

In abrasion resisting and similar critical applications, it is necessary to use a minimum of plasticizer, since the plasticizer of itself can scarcely be expected to add to the qualities contributing to abrasion resistance. Most of these materials are liquids which are volatile at processing or curing temperatures, and in the operations of mixing and processing it is possible for the material to be sprayed or atomized into the atmosphere. For these reasons the plasticizer must not be toxic either to the respiratory system or to the skin and it must not possess an objectionable odor. At the present time, and probably more so in the future there will be less and less of a disposition on the part of labor to tolerate any odors which they deem objectionable.

MATERIALS USED

Plasticizers for the rubber industry come from many sources. Among the cheapest are those derived from petroleum where usable products are available at approximately 2c per pound. Very slightly above this class are certain products of wood distillation and coal tar, and at the top of the list of commonly used naturally derived products are those from vegetable oils which range as high as 17c per pound. The uses of these latter materials are extremely limited. Above these classifications stand a group of materials which may be roughly termed "esters" which range from 23 to 55c per pound. These materials have never found an extensive use in natural rubber but have been valuable in compounding oil-resisting rubbers.

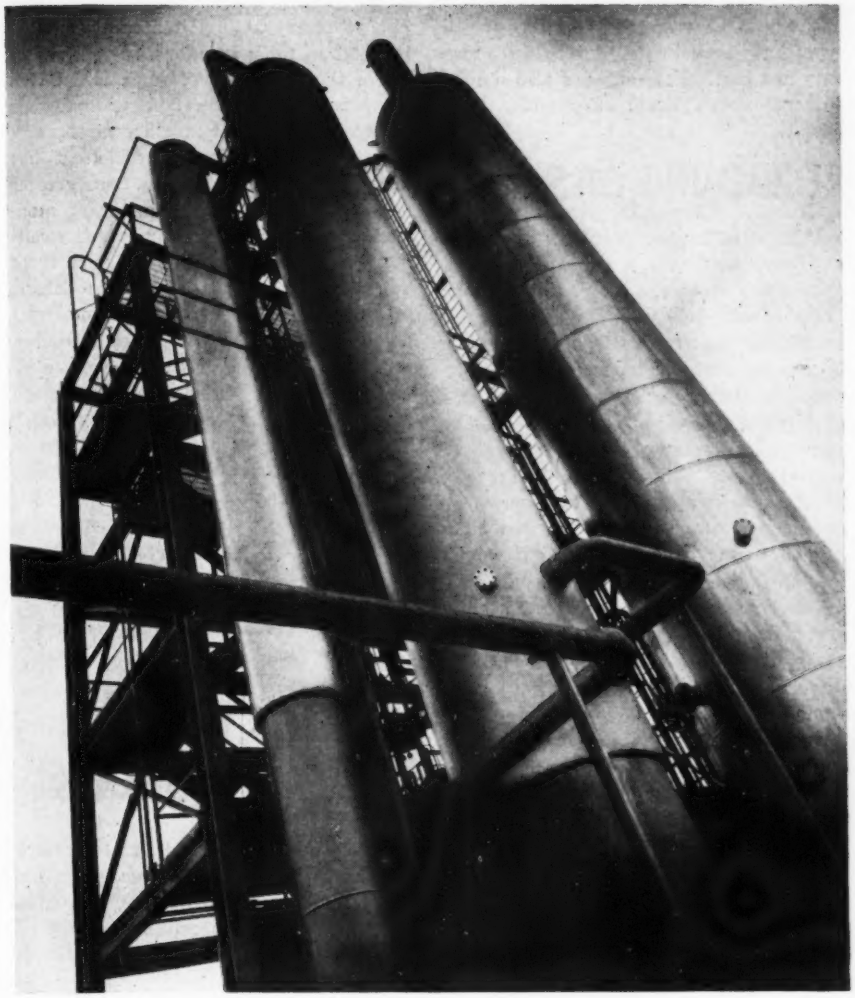
To return to the four purposes accounting for the use of plasticizers, the first, the softening of uncured compounds for processing purposes, is a field which for natural rubber seems, to the writer, to be adequately covered. Cheap, effective, and well controlled materials are available for this purpose. This statement cannot be applied to synthetic rubbers. With the large production of goods from GR-S, there has naturally been considerable effort expended, and of the synthetics, GR-S no doubt has the largest number of softeners available. With Neoprene and with the acrylonitrile types it is often necessary and desirable to use the more expensive "ester" plasticizers. This field, in civilian production, will be small in comparison to the military production of the last few years and would not, therefore, seem to be a promising field of investigation.

The second purpose for plasticizers, producing tack in uncured compounds, has been an extremely difficult one with the synthetics. Compared to these, natural rubber presented practically no problem at all. Again, with the large production of GR-S in the past few years, much work has been done on this problem and the best materials available to date have not proved equal to natural rubber in tack. With the return of natural rubber and its probable use in mixtures with GR-S, it would seem that this problem will become less critical. With the oil-resisting synthetics, such as Neoprene and the acrylonitrile types, fairly satisfactory tack can now be obtained, although, as stated before, this would be a limited field.

LOW TEMPERATURE FLEXIBILITY

The last problem, namely, to produce an improved low temperature flexibility in the cured product, is one in which the writer personally has a great deal of interest. During the war, extreme cold temperature requirements were written into many military specifications. In many instances the problem was handled by adding sufficient low-temperature resisting plasticizers to permit the rubber or synthetic rubber product to be, as in the

Presented to the Chemical Market Research Association, Hotel Cleveland, Cleveland, O., December 13, 1945.



Solvent recovery unit at the B. F. Goodrich Company plant in Akron, Ohio. The largest of the three towers, at the right, is 10 feet in diameter, 78 feet high, and weighs 65 tons.

case of hose, simply bent without rupture in a specified arc. With the return to civilian production, the cold resisting requirements are not so severe insofar as sub-zero temperatures are concerned; but there are demands for more flexibility and resilience than can be indicated by a simple bending test. Of all the rubbers previously mentioned, natural rubber appears to show the least change in properties with decreasing temperatures. In some applications at present under development, however, natural rubber is not satisfactory in temperature ranges normally encountered in this country. An effective low-temperature resisting plasticized for natural rubber which would permit it to retain substantially more of its resilient properties at temperatures in the neighborhood of 0° F would meet with substantial acceptance. Such a material should not have to be used in amounts which would degrade other physical properties to any marked degree. Further, all cold resisting plasticizers should be carefully tested for volatility at elevated temperatures. In addition to satisfactory performance at low temperatures, rubber products are frequently required to withstand elevated temperatures where a loss of volatile plasticizers will create difficulties. The problem of the change in the physical properties of rubber with temperature may be one which cannot be overcome by the simple addition of a plasticizer, in which event it may be necessary to use an improved cold resisting synthetic rubber in place of, or in combination with, natural rubber. None of the synthetic rubbers herein mentioned is as good as natural rubber in this respect, and the problem in this phase, therefore, becomes one of developing a new synthetic.

Neoprene, being poorer than natural rubber in cold resistance, needs such a material all the more, but its limited applications in this critical field would hardly justify a great expenditure of effort. Neoprene and the acrylonitrile synthetics can be made sufficiently flexible at low temperatures to withstand bending, and this probably covers a good portion of their applications.

PLASTICIZING AGENTS

In the classification of chemical plasticizing agents we find a group of materials which produce a softening of rubber, either natural or synthetic, when used in relatively small amounts compared to the amounts of plasticizers customarily used. These materials have at times been termed "peptizing agents" in the sense that they cause a reduction in the colloidal dimensions of the rubber molecule. The term "chemical plasticizing agent" is probably a safer one, since heat and oxygen seem to play some part in their behavior.

For natural rubber compounds certain of the commonly used organic accelerators, when processed at the proper temperatures, will produce this type of softening or plasticization. In addition, there are on the market very effective materials sold expressly for this purpose. Certain of the commonly used ones are aromatic mercaptans. While these materials are sold at relatively high prices, only very small amounts are required and the field appears to be a limited one which is now rather adequately covered.

USED FOR GR-S

On GR-S, considerable work has been done with these and new types of materials to accomplish a similar effect. While some good materials have been found and are being used, it is necessary to use substantially greater amounts, and the cost is, of course, proportionately higher. These materials generally degrade tensile strength to some degree and the use of chemical plasticizing agents is often excluded for this reason. It should also be considered that chemical plasticizing agents are competing with mechanical breakdown operations, and it has at times been found that their cost is such that they cannot compete with the mechanical method. Toxicity and dermatitis have also been a problem in certain instances. In the case of some of the materials offered, it was necessary to operate the Banburys at temperatures in excess of that deemed good practice from the standpoint of lubrication and wear. Also, not all of the GR-S synthetic rubbers behave the same or respond the same to the same peptizing agent, which creates further complications.

SOLVENTS

The large scale use of solvents in the rubber industry is generally governed by the following three factors:

1. Toxicity and non-objectionable odor;
2. Solvent efficiency, under which might be listed:
   a. Speed of solution,
   b. Per cent solids for a given viscosity,
   c. Desired cement characteristics;
3. Economy.

For general use in the rubber factory and excluding from consideration special closed systems, first consideration must be given to the workman with regard to the toxicity and possible objectionable odor of the proposed solvent. This is a

difficult factor to evaluate since in many cases personal reactions are involved.

The second factor must certainly be the results obtained in the way of solvent efficiency. Contributing to solvent efficiency would be the speed of solution, the per cent solids for a given viscosity, and the desired cement characteristics. Desired cement characteristics would be reflected by the texture of the cement, the tack and nature of the cemented surface, and the rate of drying. Last and not least in the major factors, economy must be considered since in most cases the solvent is lost and cementing operations, at best, are not economical in comparison to other methods of processing rubber compounds. These three factors can very seldom be maintained at an optimum; and in practically every instance, some compromise must be made.

As solvents for the non-oil resisting rubbers—namely, natural rubber, GR-S, and butyl—petroleum naphtha fractions have been extensively used with generally satisfactory results. Toxicity and objectionable odor are at a minimum. Solvent efficiency is fair and economy is good.

SOLVENTS NEEDED FOR OIL-RESISTING RUBBERS

For the oil-resisting synthetic rubbers, however, the problem becomes more complex. For Neoprene and the acrylonitrile types, benzene, toluene and xylene may be used in mixtures with other solvents. Of the three, toluene is probably the most frequently used. Methyl ethyl ketone has also been used extensively with the acryllonitrile types, and its toxicity is not objectionable. However, it has been our experience that workmen strenuously object to the odor of methyl ethyl ketone, and for this reason its use has been limited to mixtures where the odor is less apparent. Chlorinated solvents of all types have been limited due to their toxicity and cost. Economy has also limited the use of esters and nitroparaffins.

RECLAIMING OILS

In most reclaiming processes two types of oils are used—one, a powerful swelling agent and the other, a lubricating or softening agent. For natural rubber scrap, among the most commonly used swelling agents are coal tar naphtha and certain wood distillation products. Aromatic derivatives of coal tar are known to possess a very high swelling effect on vulcanized natural rubber. Since it is necessary to use these materials in substantial amounts, and since approximately half of that used remains in the finished reclaim, it would be highly desirable if more potent materials could be found. This would not only permit the use of less material, but since less material would remain, the finished product would be of higher quality and would give less trouble from "gassing" during further processing. Also, less odor would be apparent in the finished products. A great number of materials have been investigated for this purpose, and if something substantially better than coal tar naphtha could be found ,t would find acceptance as a swelling agent for natural rubber scrap in the reclaiming industry. In the field of plasticizing or simple softening agents, there are available a large number of economical, well controlled products and it is our opinion that this is not a fruitful field of investigation. The plasticizing agents are commonly used to overcome, to some degree, the aging or drying out of the finished reclaim. The petroleum industry has been able to supply a single material performing both of these functions.

For the reclaiming of vulcanized GR-S compounds, the same type of materials are used except that in order to obtain a smooth and satisfactory reclaim it has been found necessary to use even greater amounts of swelling agents, causing more "gassing" and odor. An improved swelling agent for GR-S scrap, of which there will be a great quantity in the future, offers even more promising commercial possibilities than one for natural rubber scrap. At the present writing we are in, or approaching, an intermediate stage where the scrap is a combination of GR-S and natural rubber; and the condition is intermediate to the two described above. Odor in strictly military applications, with certain obvious exceptions, has not been a serious problem in the past few years; but with a heavy return to civilian requirements, it can be readily appreciated that an undesirable odor will soon be reflected in product acceptance.

PIGMENTS, ACCELERATORS, ANTIOXIDANTS

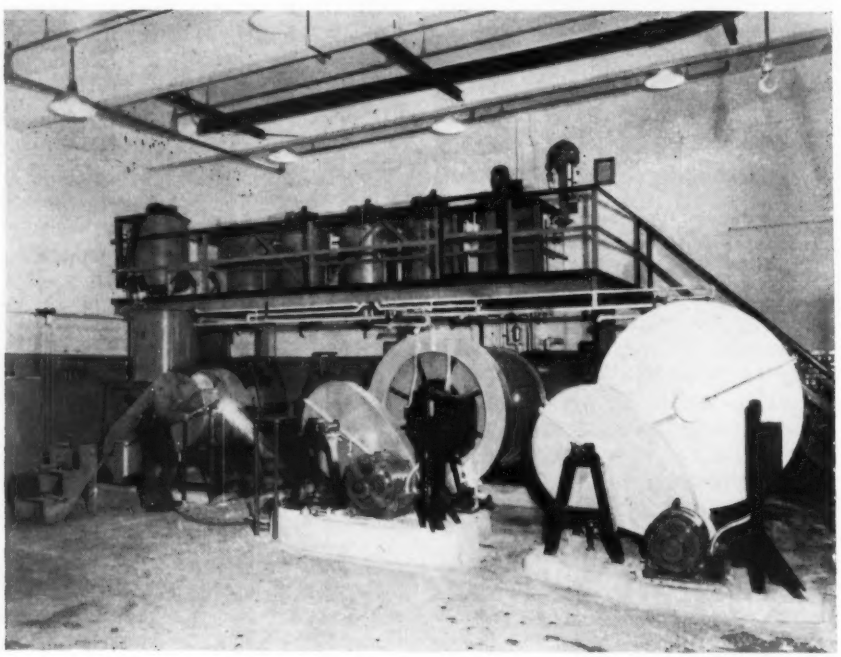
These three unrelated subjects are grouped together because it seems to the writer that these fields, with one or two exceptions, have been extensively investigated and the requirements are fairly well supplied.

Pigments are available for practically all requirements at present under consideration. Of course, large tonnages are involved and there is always the possibility of a small savings at equal quality producing a sizable overall savings for a given period of time.

A complete line of accelerators is available covering satisfactorily all major requirements. With electronic curing and injection molding, where the stock is heated quickly to curing temperatures just prior to entering the mold, it is quite probable that delayed-action accelerators will find wider applications, since large temperature gradients will not be a problem in the curing of thick sections.

The field of antioxidants, as such, also seems to be adequately covered. By this is meant the protection of the various rubbers against oxidation. Antioxidants, however, have probably been used in greater tonnage as flex cracking resistors than as simple antioxidants, and while this field has been extensively explored and a number of effective products developed, there is always room for improvement. In the field of non-discoloring antioxidants for white or light colored stocks, the potency of the materials presently available does not measure up to that of antioxidants with staining or discoloring characteristics. More powerful non-discoloring antioxidants would be very desirable.

(*Turn to page 492*)



Hewitt Rubber Co.

In the foreground are ball mills for grinding chemicals which are added to liquid latex in the manufacture of latex foam. On the balcony are storage tanks for dispensing raw materials.

No. 4 of a series on
INFORMATION SOURCES FOR CHEMICAL MARKET RESEARCH

Services and Publications of The U. S. BUREAU OF MINES

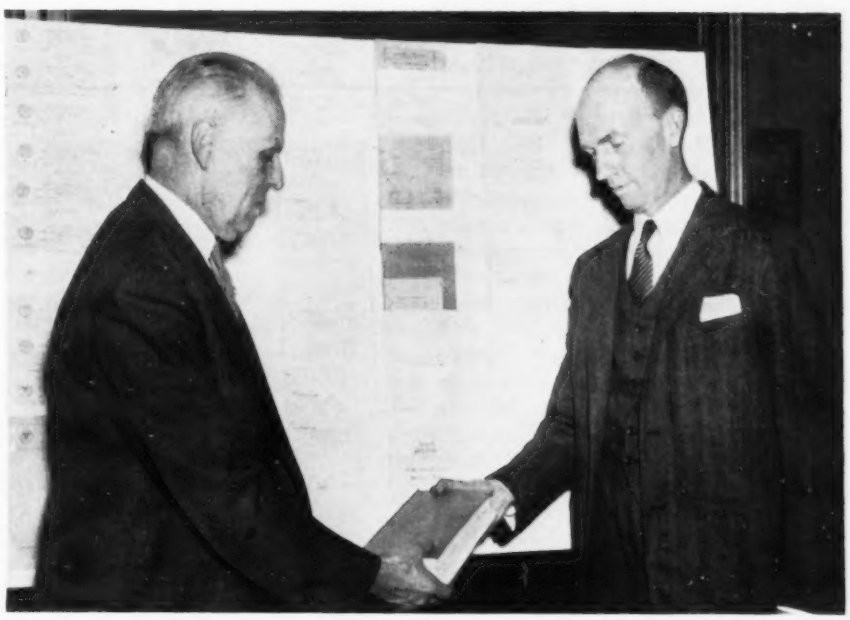
by RICHARD M. LAWRENCE*
Development Department, Atlas Powder Company
Wilmington, Delaware

THE DISTINGUISHED record of the Bureau of Mines includes many achievements which have greatly improved the lot of the men who handle explosives or work in mines. The Bureau is also highly regarded for the internationally recognized authorities who have served on its staff.† But of all its accomplishments, probably the most fundamental and far reaching is the vast body of information on our mineral resources and mineral industries that it turns out year after year for the use of business, government, and any other interested parties.

This part of the Bureau's work that is concerned with the gathering and distribution of minerals data is centered in the Economics and Statistics Branch. In touch with every mineral operation in the nation, this group measures the ebb and flow of trade in every ore and metal, of petroleum, coal, gas, and industries that use these minerals. Its charts and figures are the base for planning operations by mineral producers and consumers, the government, railroads, and investors.

With massive files of data and thousands of reports by its commodity experts, engineers, statisticians, and map makers, the Bureau is the nation's treasure house of business information on the mineral industries. Its vast resources, greatly expanded as a result of the war, are invaluable to chemical market researchers.

The basic position of the Economics and Statistics Branch is emphasized by the heavy additional wartime responsibilities placed upon its chief, Elmer W. Pehrson. He served the government simultaneously as secretary of the Minerals Advisory Committee to the Army and Navy Munitions Board, as a member of the Interdepartmental Committee on Strategic Minerals, as a member of the Interdepartmental Committee on Policy for Export Control, and as a member of the Army and Navy Munitions Board Committee on Strategic Materials, Specifications and Storage. More recently he has authored a paper dealing with national policy and our decreasing self-sufficiency in minerals, which has attracted national attention. In addition to his official duties, Mr. Pehrson finds time to serve as chairman of the Washington Section of the American Institute of Mining and Metallurgical Engineers, and he has been selected as chairman of the Mineral Economics Committee of the national organization for the current year.



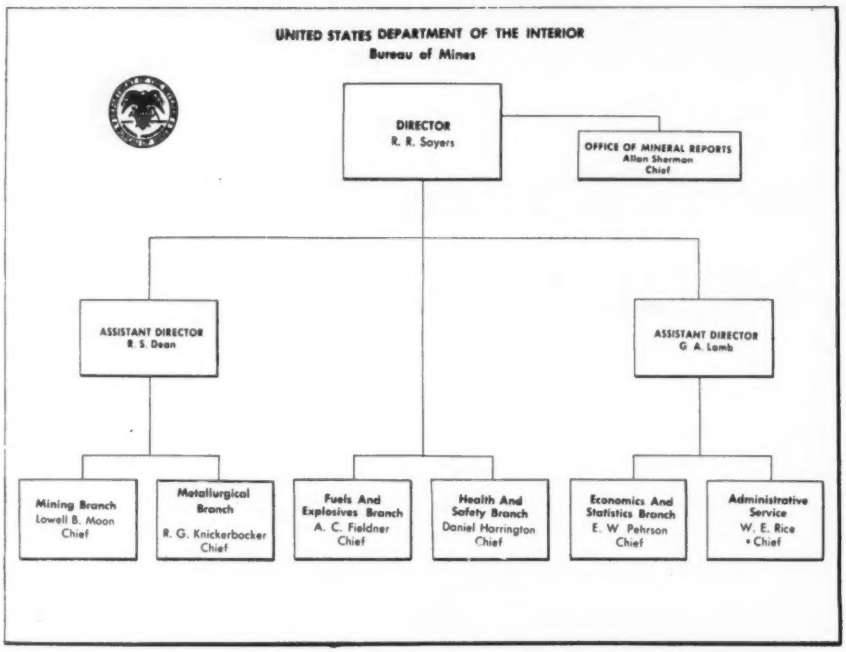
Dr. R. R. Sayres, director of the Bureau of Mines, accepts a copy of the Minerals Yearbook from George A. Lamb, assistant director. Background is an exhibit of Bureau publications.

The Bureau of Mines has nearly 4,000 employees, but only 20 per cent of them are in Washington. The great majority, in branch offices and field staffs, literally bring the Bureau to the mines. The Economics and Statistics Branch is in particularly close touch with the men who run the mine shafts and quarry pits, with whom it carries on annual, monthly, and even weekly correspondence on production, consumption, stocks, prices, foreign trade and prospects.

Information is obtained through cooperation on a vast scale by thousands of mine, mill, and smelter operators, trade associations, distributors, consumers, public officials, and State agencies, trade journals, and others interested in the mineral industries. It is a striking fact that the Bureau invokes no statutory authority to compel responses to its requests for information but instead "earnestly seeks cordial cooperation"—and gets it, through

* The author acknowledges with gratitude the cordial cooperation of the Bureau of Mines in supplying information on which this article is based.

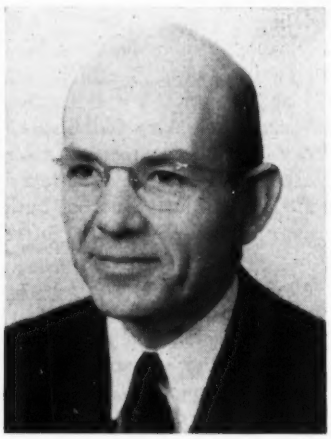
† Dr. Scott Turner served as president of the American Institute of Mining and Metallurgical Engineers; C. I. George A. Burrell, gratefully applauded by all those who struggle with gas analysis, is a leading chemical engineer in the petroleum world, and Dr. F. G. Cottrell, of precipitator fame, has been the recipient of the Willard Gibbs Medal, the Holly Medal (ASME), the Perkin Medal, and others. Dr. Arno C. Fieldner is an international authority on fuel technology and coal research and was awarded the medal of the Institute of Fuel in 1942. Dr. R. R. Sayers, who became Director of the Bureau after an already distinguished career in industrial health, is a past president of the Association of Industrial Physicians and Surgeons. The late Dr. Charles E. Munroe was long the dean of American explosives chemists.



good-will and confidence. These close and cordial contacts with the men of the minerals fraternity lend an invaluable vitality to the Bureau's interpretations of the economic forces that shape the statistical records.

In their studies of raw materials, chemical market researchers find basic and detailed information in Bureau of Mines reports on such mineral products as salt, sulfur, coal (and coke and coal-tar), petroleum, natural gas, phosphate rock, potash, nitrogen compounds, lime, fluorspar and the ores and salts of various metals. The output of these same products measures the markets for explosives to mine them and chemicals to process them. With much in common between the technologies of the mineral and the chemical industries, the markets for chemical process equipment occupy important territory in the Bureau of Mines' great empire of minerals. In a number of fields the Bureau's directories of producers constitute ready-made lists of customers for chemicals and equipment.

The Bureau's postwar program is impressive. All regular economic and statistical services will be continued, with generally broader scope and more frequent publication. It also contemplates the release of a wealth of data which were withheld under wartime restrictions.



E. W. Pehrson and T. H. Miller, chief and assistant chief of Economics & Statistics Branch

ORGANIZATION

The Department of the Interior, with its great responsibilities for our natural resources, comprises a large number of agencies, among which the Bureau of Mines and the Geological Survey cover the mineral kingdom. Although distinct organizations, the traditionally close cooperation between these two agencies has multiplied the effectiveness and enhanced the reputations of both. Among other duties, the Geological Survey makes explorations of mineral resources and, on finding a deposit which may have commercial significance, makes a report to the Bureau of Mines. The Bureau of Mines is then charged, among other things, with the task of making measurements and determining the commercial characteristics of the deposit. Under pressure of the war both agencies accelerated their exploration work.

The Bureau of Mines was established in the public interest in 1910 to conduct scientific and technological investigations on mining and the preparation, treatment, and utilization of mineral substances; to promote health and safety in the mines, to conserve mineral resources and prevent their waste; to further economic development and to increase efficiency in the mining, metallurgical, quarrying and other mineral industries and to inquire into the economic conditions affecting these industries.

The Bureau publishes a great volume and variety of documents disseminating information on the mineral industry. These cover subjects of interest to every branch of the industry—the mineral producers, the concerns which purchase, process and fabricate minerals and those who market the resulting products and manufactures.

The Bureau provides accurate, comprehensive information on all phases of domestic mineral production, imports, exports, and consumption and covers many foreign mineral industries. Now that restrictions for security purposes have been raised, its many current and periodical publications are again up-to-date. For mineral fuels, about 40 metals and as many nonmetals, the Bureau makes continuous studies of the situation in every important commercial nation. Aside from this current picture, the Bureau also has information on practically every known mineral deposit in the United States and Alaska, and can thus effectively aid in studying immediate and potential developments of these resources.

The Bureau's policy is to provide information and consultation services on market conditions and prospects as long as confidences are not violated by the Bureau in imparting information from individual companies or other confidential sources. The Bureau plays an active part, in peace as in war, in giving advice and information to other government agencies on the mineral industries. This includes not only the extraction of minerals, but also the preparation, treatment, and utilization of both primary and secondary minerals.

The great scope of the Bureau's operations is indicated in the chart showing its organization into five major branches, which carry on the following functions:

1. *Mining Branch* (Lowell B. Moon, Chief) conducts engineering examinations, exploratory projects and related studies to discover and prove additional deposits of critical and essential minerals. It also promotes conservation of known mineral deposits through the improvement of operations in existing mines.

2. *Metallurgical Branch* (Ray G. Knickerbocker, Chief) carries on a broad program of fundamental and applied re-

search on conservation, preparation, and utilization of metals and nonmetals, including related ore dressing functions. During the war, this program was concentrated on critical minerals.

3. *Fuels and Explosives Branch* (Arno C. Fieldner, Chief) is responsible for all fundamental, process and pilot plant research and engineering consultative services on coal, petroleum, natural gas, synthetic liquid fuels, mining explosives and military high explosives. It is also responsible for production of helium and investigation of deposits of coal.

4. *Health and Safety Branch* (Daniel Harrington, Chief) conducts scientific studies of mining health conditions and engineering investigations of safety factors in the mining industry. It controls the manufacture, transportation, storage, and use of explosives, and made war security inspections of the Nation's mines.

5. *Economics and Statistics Branch* (Elmer W. Pehrson, Chief) is the branch with greatest interest to the chemical market researcher. It conducts statistical canvasses and economic analyses of capacity, production, distribution, consumption, stocks, prices, employment, and related factors with reference to all types of minerals. It surveys the relationship of domestic production to international trade, with particular reference to the national dependence on imports. It reviews current business conditions in the mineral industries, and studies long and short term economic trends in the mineral industries. It cooperates with other Federal, State, and private research agencies in matters relating to the conservation and most effective utilization of mineral resources. An accompanying chart shows the organization of this branch into seven divisions, which operate as follows:

NEXT MONTH

The fifth article of this series, to appear next month, will cover three other Interior Department agencies: the U. S. Geological Survey, the Bonneville Power Administration, and the Fish and Wildlife Service. When the series is complete, it will be reprinted in booklet form.

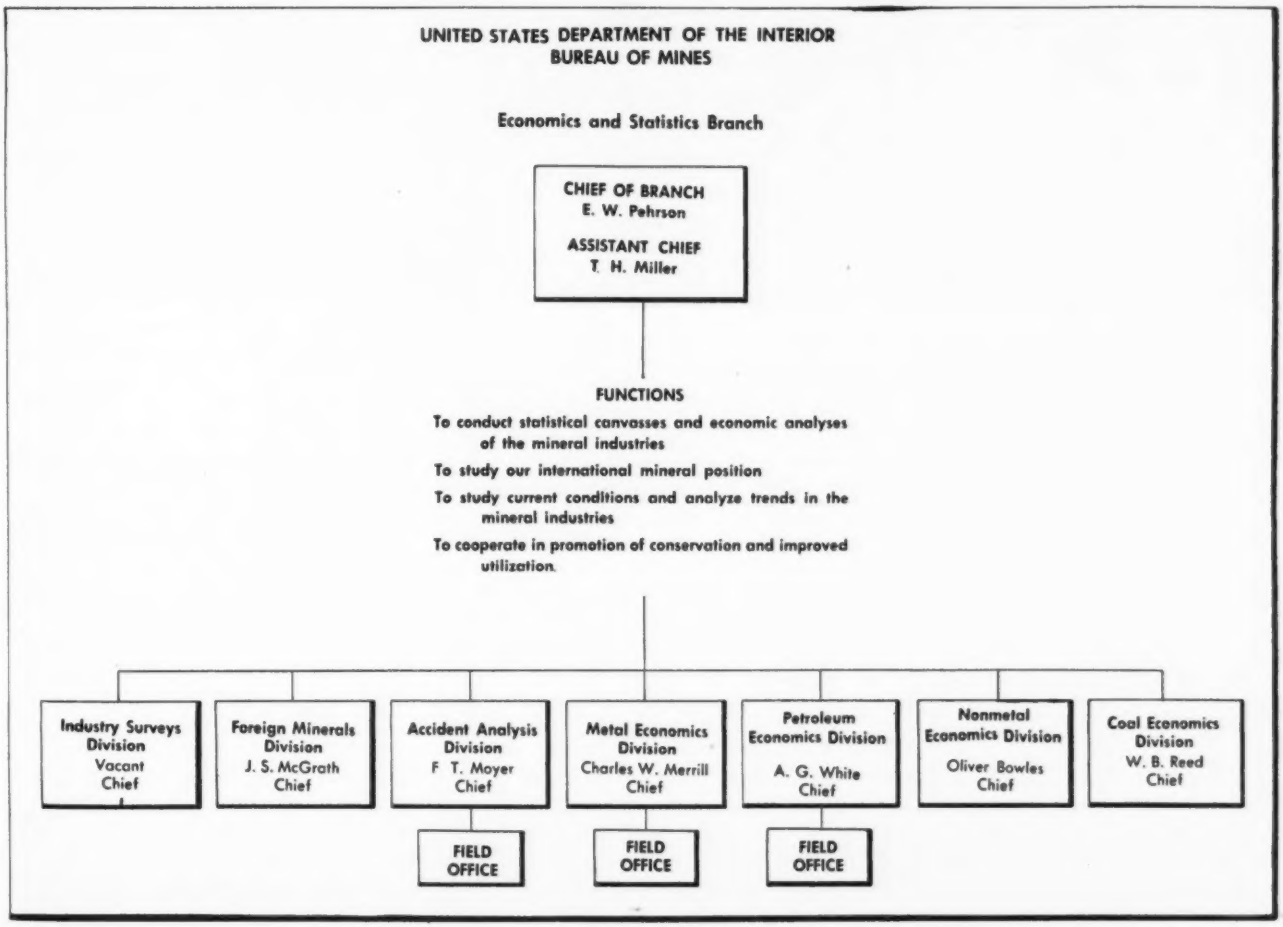
a. Industry Surveys Division will, when organized, concentrate on economic analyses from a national viewpoint. It will correlate all economic data available, and conduct broad inquiries into the economic problems related to mineral supply, distribution, and use. It will also correlate and analyze mineral information on a regional basis and prepare reports essential to the solution of local problems and development of regional resources.

b. Foreign Minerals Division compiles and analyzes data on foreign mineral industries including resources, production, international trade, markets, commercial and political control and mining laws. It also assists the Department of State in the technical direction of its mineral attaches and mineral reporting services from foreign offices. The program provides information required by domestic industries seeking foreign markets for mineral products, or foreign supplies of raw materials, or opportunities for investment abroad. The data collected by this Division are also of importance to the Government in the determination of trade policies.

c. Accident Analysis Division deals with statistical and analytical studies of the causes and frequencies of accidents in the mineral industries.

d. Metal Economics Division conducts statistical and economic studies dealing with primary and secondary metals. The study program encompasses the mining, processing, distribution, and use of metallic ores, scrap, and refined metals. The program provides statistical services and analytical reports on the primary and secondary metal industries that are needed by industry, the public, and Government for the efficient planning and conduct of their respective operations.

e. Petroleum Economics Division carries on economic and statistical studies covering virtually every phase of the petroleum, natural gas, natural gasoline, carbon black, and asphalt industries. In addition to providing invaluable commercial intelligence, the statistical services and analytical reports of this Division are

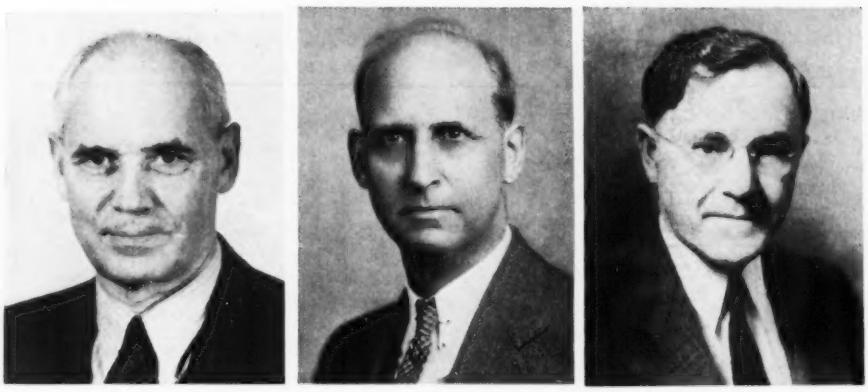


widely used as the basis of State proration programs. Of unusual significance is the Division's monthly forecast of crude oil demand.

f. Nonmetal Economics Division conducts statistical and economic investigation of the nonmetallic mineral (except fuels) industries such as building materials, chemical raw materials, fertilizers, abrasives, and refractories. The increasing importance of these raw materials in the process industries makes this phase of the work particularly useful to the chemical and related industries.

g. Coal Economics Division makes statistical and economic investigations relating to bituminous coal, anthracite, semianthracite, lignite, peat, coke and coke by-products, and fuel-briquetting and packaged fuel industries. Statistical services and analytical reports derived from this program furnish the basis for planning and conduct of operations by the coal industries and by the Government.

J. S. McGrath, chief Foreign Minerals Division; F. T. Moyer, chief Accident Analysis Division; Charles W. Merrill, chief Metal Economics Division



A. G. White, chief Petroleum Economics Division; Oliver Bowles, chief Nonmetal Economics Division; and W. B. Reed, chief Coal Economics Division

SPECIAL SERVICES

The Bureau supplies the mineral industries and other interested groups with a great deal of information through correspondence and interviews. The Bureau also has in its files information which has been withheld from publication because of wartime restrictions or has not been processed in the form in which a particular person or firm might desire it. To the extent that budgetary restrictions permit and if no confidences are violated, the Bureau attempts to furnish pertinent information to responsible firms and individuals.

The Bureau also furnishes extensive technical consultative services to other government agencies.

POSTWAR PROGRAM

The Bureau of Mines has already resumed the publication of practically all of the series which were classified as confidential during the war, and issues which were classified as confidential have now generally been reclassified. Considerable information was accumulated during the war, however, which has not been released in any form. Release of a considerable part of this information is contemplated just as soon as it can be organized and prepared for publication. This includes both technical and statistical data.

The Bureau's postwar program is of especial interest to chemical market analysts. All regular statistical and economic services will be continued. At the same time it is the Bureau's aim to make available to industry and the public more information than it has in the past. Friends of the Bureau hope that an adequate budget will be devoted to this important program.

The heavy depletion in many mineral resources has convinced the Bureau that serious study must be given to the adequacy of future mineral supplies. As known commercial reserves tend to be exhausted, requirements will have to be supplied from foreign and marginal reserves, and the use of substitutes will be emphasized. Considerable work is yet to be done on exploration and more should be known about the size of reserves. Immediate explorations are needed in the United States and Alaska on chromium, manganese, nickel, cobalt, copper, fluorspar, lead, zinc, magnesium, mercury, molybdenum, tungsten, vanadium, and many pegmatite, and nonmetallic or industrial minerals. A physical inventory of mineral reserves is essential. As a result of these investigations the Bureau will publish reports on mineral resources and the long-range prospects of mining activities related to each mineral and prospects of industries depending on these basic materials. These reports will be of prime importance to industry in planning industrial operations and to the Government in formulation of public policy.

It is also planned that the Bureau will cover additional economic aspects of the mineral industries which have been covered only infrequently in the past or not at all. These projected activities will include greater emphasis on analyses of costs and competitive relationships in mineral markets and continuing studies of existing market conditions, short-term, intermediate, and long-range market prospects for all of the more important minerals. The Bureau also plans to strive for more prompt and frequent release of certain types of data. In short, it is the Bureau's desire to give industry, the government, and the public all economic services that are required for efficient planning and operation, and for which the expenditure of public funds can be justified.

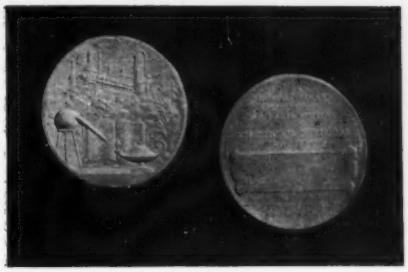
PUBLICATIONS

The Bureau's printed publications, which are sold by the Superintendent of Documents (Government Printing Office, Washington 25, D. C.) comprise Bulletins, Technical Papers, Economic Papers, Minerals Yearbooks, Handbooks, Schedules, and Miners' Circulars.

Processed publications, which provide prompt release of information, but are of less permanent value, comprise Reports of Investigations, Information Circulars, Periodical Reports, and Mineral Market Reports. These and the Annual Reports of the Director are obtainable free on request to the Office of Mineral Reports, U. S. Bureau of Mines, Washington 25, D. C.

The general catalogs, "List of Publications of the Bureau of Mines," 1910-1937 and 1937-1942, and annual supplements through 1944, provide exhaustive subject and author indexes, with brief descriptions of each document. Reports issued from January 1945 to date are

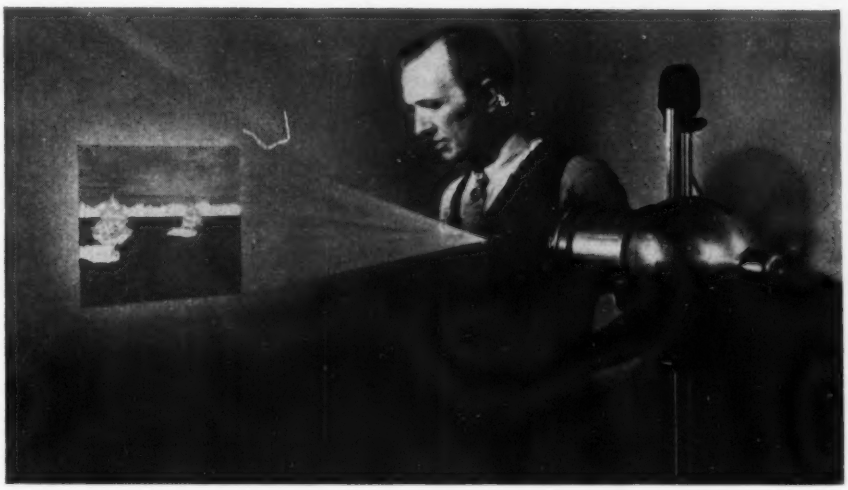
(*Turn to page 472*)



A. C. S. Award Nominees

Carl F. and Gerty T. Cori, professors at Washington University School of Medicine, have been named co-winners of the annual Midwest Award by the St. Louis Section of the A. C. S. The Cori's are cited particularly for their meritorious research in the study of chemical reactions of living cells.

The formal presentation of the gold medallion, pictured above, will be made late this month at St. Louis.



New Photographic Development

Printing photographic murals directly on walls, is one of the uses suggested for a process developed by Glenn L. Martin Co., Baltimore. Basis of the process is a jelly-like emulsion which can be melted and painted on metal, wood, cloth, leather, and plastics, to render the surface sensitive to photographic reproduction.

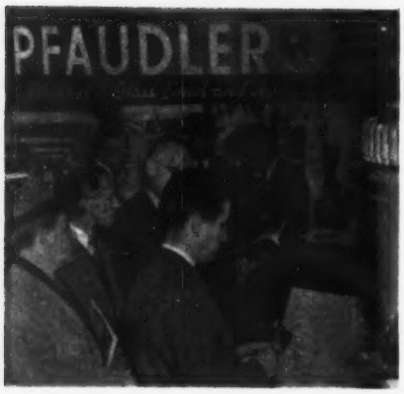
During the war the method was employed in industry to project drawings on metals, etc., to produce machining outlines.

New Allied Chemical Research Center

Pictured at right is an architect's drawing of the $1 million central research laboratory being built by Allied Chemical & Dye Corp. near Morristown, N. J.

The new unit will serve to supplement and coordinate the activities of Allied's other divisional laboratories, and is scheduled for completion early next year.

The main operating groups in the Allied organization are: The Barrett Division; General Chemical Co.; National Aniline; Semet-Solvay, and Solvay Process Co.

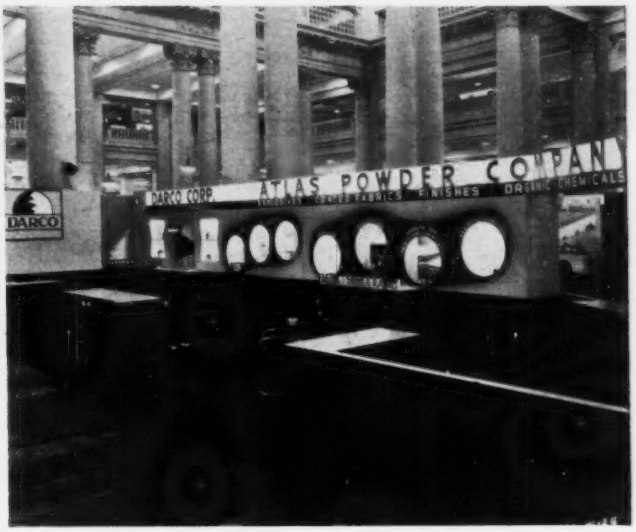


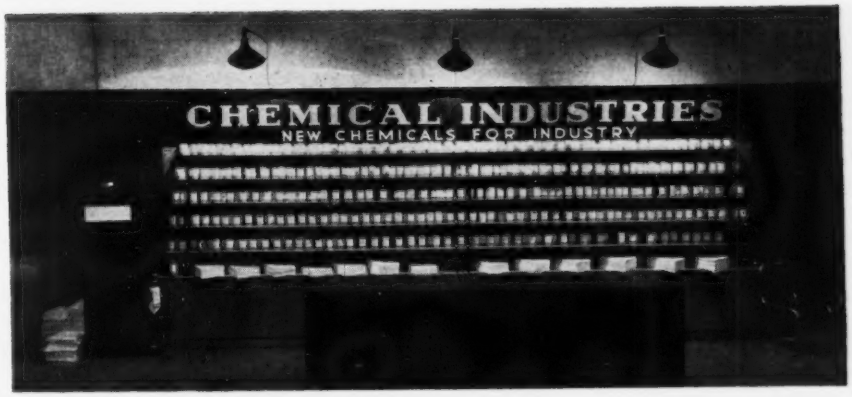
20th Chemical Exposition

The 20th Exposition of Chemical Industries, held at Grand Central Palace from Feb. 25 to March 2, was marked by a record attendance of some 45,000 visitors, with unusual interest evinced in the exhibits of new chemicals and processing equipment. More than 400 companies took advantage of the first postwar Exposition to place before executives, chemists, and engineers the products they have developed or improved during the past two years.

A feature of this year's "Chem Show" was the wide range of chemicals, process equipment, and control instruments exhibited—many of which are the result of intensive wartime research, and are now available for peacetime applications.

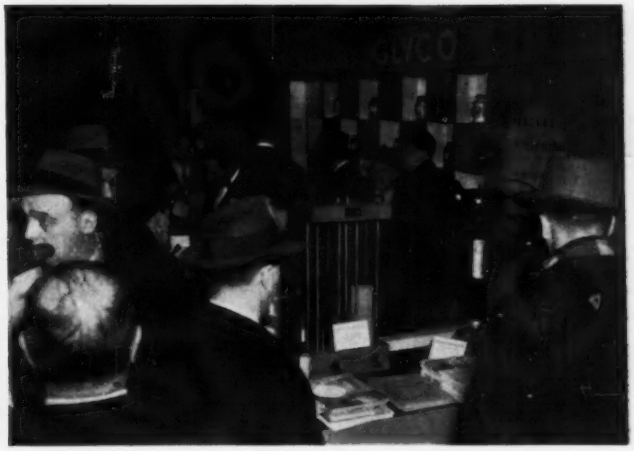
Significant, too, was the closer balance evident between the space allotted to





chemical exhibits and to equipment displays, effected by the participation of a larger number of chemical manufacturers.

Pictured on these pages are booths of several of the exhibitors, and at right the CI display of 600 new chemicals developed since 1944. All of those shown are potentially available in quantity; some have ready markets established; others have yet to find fields of application.



HEADLINERS in the NEWS

ALLEN B. WILLIAMS advanced to president of Aluminum Ore Co., producers of alumina and synthetic cryolite. He succeeds C. B. Fox who retired recently.

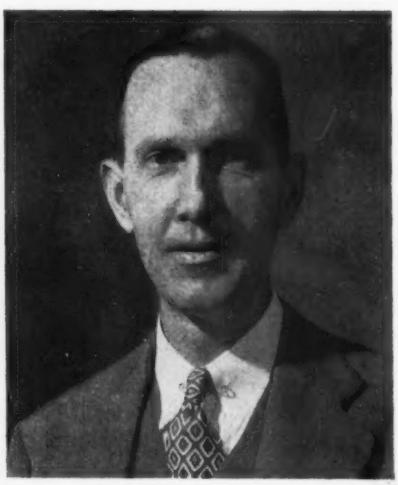
MAURICE L. MOORE appointed assistant vice-president in charge of research of Frederick S. Stearns & Co. Dr. Moore joined Stearns research laboratory in 1943.

LYLE D. GOODHUE, for 12 years associated with the USDA Entomological Laboratories, has joined Airosol, Inc., Neodesha, Kan., where he will direct research in insecticides.

J. H. McMURRAY, promoted to assistant general manager of Cyanamid's Calco Division. Associated with Calco since 1915, he was formerly director of engineering.

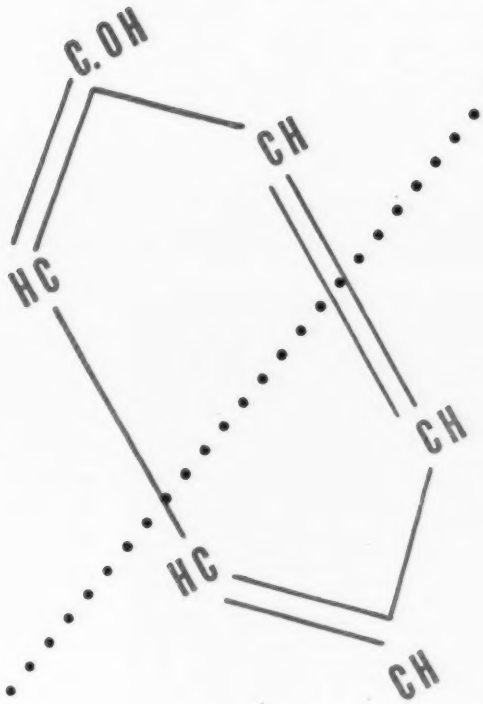
JOHN C. WARNER, head of Carnegie Tech's Dept. of chemistry, awarded the Pittsburgh A. C. S. citation for outstanding service to chemistry in 1945.

JAMES McWHIRTER, named superintendent of Pennsalt's Natrona plant. He joined Pennsalt last summer after eight years with General Chemical in Detroit and Cleveland.



ROBERT C. HILLS, returning to New York from Nicaro Nickel Co., Cuba, has been named technical assistant to the president of Freeport Sulphur Co.

PHILIP S. WINNEK has joined Commercial Solvents Corp. to direct a pharmaceutical research group. Dr. Winnek holds several amino acid and sulfaguanidine patents.



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BETWEEN THE LINES

Domestic Mercury Question

Shall U. S. production of mercury be curtailed to conserve dwindling domestic ore reserves? This is the question being debated in Washington and in the industry as foreign sources again yield ample supplies. The outcome probably will have a bearing on the price to the user.

IN HEARINGS before the House Appropriations Committee recently, Tariff Commission spokesmen mentioned the surveys being made of competitive situations in various commodities affecting American interests. Among the studies reported to be under way was one dealing with mercury, which has perhaps its largest use in chemical compounds.

Perhaps due to the relatively minor importance in national employment figures of those engaged in mercury production, the major recommendation of the Commission has caused little attention. In effect, is calls for subordination of the domestic industry to a position as merely an emergency reserve, while the bulk of requirements would be met from increased imports. An alternative, subsidizing domestic production and stockpiling the resulting production as an emergency reserve, is suggested, but accompanied by the warning that this probably will merely hasten the complete exhaustion of already declining resources.

In this connection, pending legislation would establish field stations under the Bureau of Mines to seek out new resources in mineral deposits, including presumably mercury.

Before the war, the United States ranked behind the two outstanding mercury-producing nations of the world, Spain and Italy. Since the war, Canada and Chile have become important producers. The Soviet Union and Mexico were other prewar sources. However, Spain and Italy accounted for approximately 70 per cent of world production before the war, and it is of interest that Spain's principal source is a mine that has been worked for more than a thousand years. Although furnishing 97 per cent of Spanish mercury production, this ancient mine is stated to still possess ample reserves of ore having a mercury content of between 6 and 8 per cent, which is much higher than that of any known ore deposit of other producing countries.

Production in the United States is very scattered. Numerous small mines in California, Oregon, Nevada, Arkansas, Idaho, Arizona and Texas are the principal sources. Ores are described by the Tariff Commission as low grade, however, and the production costs high. California is rated as the principal center of domestic production, accounting for 65 per cent of U. S. output at the war peak.

U. S. Production

Production in the United States reached its peak in 1877, back in gold-rush days, when the year's output was 79,395 flasks. It reached 53,500 flasks in this war, attributable in part to the development of new ore bodies in the pressure for war supplies. This latter occurrence lends some support to the pending legislation for field mineral explorations, but does not meet the fact that mercury use in some industries is regulated by cost, on which basis the European product has the advantage.

Purifying mercury by nitric acid treatment and distillation in the General Electric Co.'s works laboratory at Schenectady.

In fact, the opinion has been advanced that for United States producers to maintain an annual production of 50,000 flasks would soon exhaust the known domestic reserves, and in any case, would encounter such declining grades of ore as to make costs prohibitive.

As compared with the mercury percentage found in Italian and Spanish ores, the American ores are stated to assay about 0.25 per cent, equivalent to about 5 pounds per ton of ore.

"It would appear therefore," says the Commission, "that the postwar policy of the United States with regard to its limited mercury resources should be one of conservation for use in possible future emergencies, a plan which would necessitate larger imports than otherwise.

"By subsidization or by restriction of imports, production might be maintained at prewar levels for some time after the war, but this would probably involve higher and higher costs, and would speed the exhaustion of our reserves.

"On the other hand, if measures were taken which would cause the immediate shut-down of the industry, appreciable losses of private investments would result and some reserves would be irretrievably lost because of cave-ins. The aim should be gradually to reduce the industry to a reasonable operating minimum from which it could be expanded under emergency conditions or used as a weapon against excessive foreign prices."

The Government's stockpile would appear to be the major weapon in this respect; during the war Metals Reserve, a government subsidiary, accumulated the equivalent of about 3 years' domestic peacetime requirements. A substantial part of this accumulation is understood to have been left abroad, and negotiations were under way for its sale to Britain, at last reports, and at a price which left this country decidedly on the short end.

Principal Uses

Most of the wartime use of mercury was in chemicals for war-making: fulminate for use in explosive compounds, detonators and percussion caps; also it is used in electrical equipment, scientific instruments and industrial control apparatus.

Many of these uses obviously declined after the war. Mercury was widely used in medical operations in the war; disinfectants, prophylactics, and antiseptics. However, even before the war ended, some chemical substitutes were being adopted. Hexanitromanitol, lead azide, and lead styphnate came into wide preference in place of fulminate of mercury, which is stated to have unstable characteristics under storage in tropical climates. Mercury also was used in manufacture of vermilion; later, other cheaper red pigments have come into greater use, such as chrome red, antimony sulfuret, and the coal-tar derivative, vermilionette. Due to wartime restrictions, chromates and lead salts were used to some extent in place of mercury in anti-fouling paints. The laws

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of some states restrict the use of mercury, for instance, in manufacture of felt, for which it was once largely used.

Mercury is essential, however, in many types of gas pressure gages, heat-control devices, gas analysis apparatus, flow meters, and others. It has wide applications in the manufacture of chlorine, caustic soda and acetic acid, for which purposes it serves as an electrode and as a catalyst. Restrictions imposed as a war measure were lifted long before the end of the war, due to the accumulating stocks.

This country, in fact, pursued a policy of both preclusive buying, as in Spain, and stimulating new sources of supply, as in Mexico, and to some degree, Canada. Purchases from foreign sources began as early as 1940. Prior to this country's entry into the war, these purchases were being made in Mexico and Chile, and were frankly in the category of preclusive buying, to keep Axis agents from obtaining supplies. Later, such buying was essentially connected with war requirements. Imports from Mexico attained considerable importance at the height of the war, that country being the largest foreign source of supply for the United States, furnishing more than 29,000 flasks per year. A flask, incidentally, weighs 76 pounds.

Before the war, the United States ordinarily supplemented domestic supplies by importing up to a third of estimated consumption. Despite the current official antipathy to cartels in any form, and the known cartel arrangements governing mercury production and sale in Europe, for instance, it is now apparent that the official policy will encourage a return to a high import rate. Possibly, due to Latin American diplomatic reasons, some emphasis will remain on imports from those sources, rather than Spain and Italy. Here again, costs inevitably will enter the situation once normal trade relations and economics hold sway again.

The Outlook

There are some bright spots in the postwar outlook, however, which are yet to be confirmed because industrial recovery has been retarded. The postwar reduction in mercury demand has resulted largely from the curtailed demand for chemical warfare materials. Total consumption, however, is expected to exceed the prewar level. There are a number of reasons, among them the increased use of mercury in drugs and pharmaceuticals, and especially new developments and research now progressing in the fields of organo-mercuric compounds for use in medicines, dyes, and agriculture. It is estimated, in fact, that these possibilities may largely, if not wholly, offset the reduction that has taken place in requirements for use in military fields.

On that point, consumption of mercury in explosives may be maintained for some time, and for some industrial purposes, fulminate of mercury is preferred to substitutes, so that munitions curtailments may indeed be offset. Much of this optimism is geared to speedy industrial recovery, however.

There is foreseen the effect of the accumulated demand for mercury in electrical and industrial uses and expanded use of lighting fixtures using mercury. The mercury cell for chlorine manufacture, as exploited widely in Germany but only to a limited extent here, offers additional possibilities.

While war years are not a reliable index to postwar trends, figures for these and comparative periods show, for instance, that use of mercury as a catalyst rose to a ratio of 9.4 percent of the total national consumption in mid-war, from the prewar level of 2.9 percent. Agricultural use rose from 1.1 percent of national consumption to 3.0 percent in 1943.

Southern Research Institute Anticipates Expansion

Southern Research Institute, Birmingham, Ala., has obtained nearly $750,000 of its goal of $2,500,000 required for additional facilities to meet the rapidly growing demand by Southern industry for industrial research.

Part of the $2,500,000 sought will be used to erect a laborattory building. Final plans call for a laboratory to accommodate 200 scientists.

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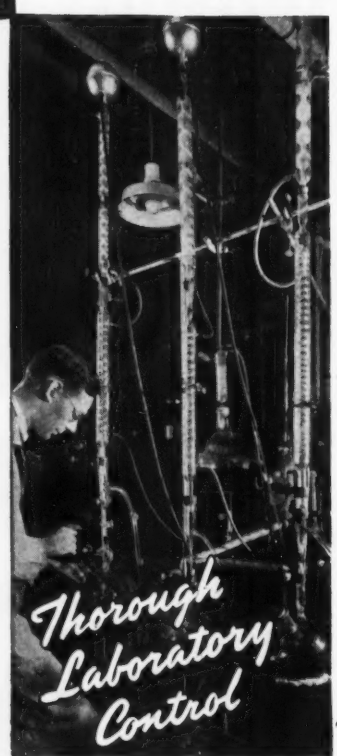

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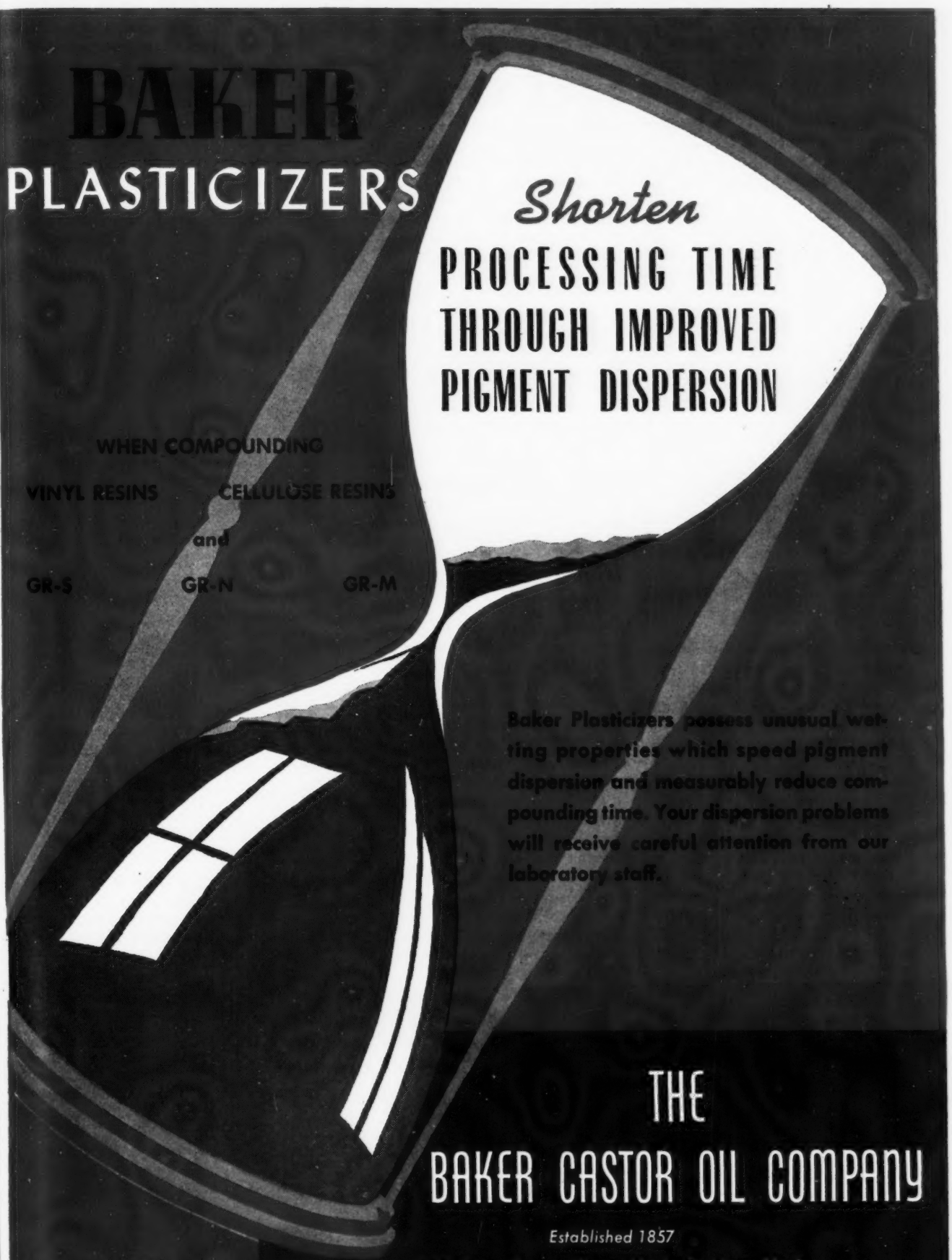

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Impregnation With Geon NP 265

Plastic latex made with Geon polyvinyl resins is now adaptable for the impregnation or plain coating of thread, yarn, string and wire, it is announced by the B. F. Goodrich Chemical Company. Cords and threads of fiberglass, nylon, silk, cotton, wool and rayon, as well as wire have been successfully coated and a variety of uses suggested, according to John R. Hoover, general sales manager of plastic materials.

A technique for stranded materials somewhat similar to that used with plastic latex in ordinary fabric coating is employed. A thin, even coat of Geon plastic latex is applied to the thread or cord and heated, preferably in a tower having a graduated temperature range from 150 to 300 degrees Fahrenheit. This method yields optimum physical properties, while fair properties can be attained with a uniform temperature of 200 degrees Fahrenheit.

The company has devised a tower apparatus in which this variable regulated temperature range can be most satisfactorily employed, and through which the material can be passed at from 10 to 50 feet a minute, depending on the thickness of the coating.

Textile fibers coated with Geon plastic latex are grease, moisture, and abrasion resistant, permeable when used in woven fabrics and have greater durability than when uncoated. Among first products on which the new process may be used are screening, woven upholstery fabrics, tarpaulins, fish lines and thin walled insulation.

Geon plastic latices have only recently been developed for commercial use. By an entirely new process, the individual resin and plasticizer particles, which normally are suspended side by side, have been combined to form uniform plastic particles, each containing its own quota of resin and plasticizer. This system greatly facilitates the formation of coherent, uniform films and coatings because the plastic particles have greater adherence to each other upon deposition, and the plasticizer has already been uniformly absorbed by the resin.

Supplied in water-dispersed form ready to plasticize, other ingredients may be added to Geon plastic latices by the processor to modify the latex to suit his particular needs. In addition to the applications just announced, they have been used as coatings or impregnants for fabric, paper, leather, and other materials.

High-Test Hypochlorite NP 266

A new high-test calcium hypochlorite, containing a minimum of 70 per cent available chlorine, is now available for civilian uses from the Columbia Chemical Division of the Pittsburgh Plate Glass Company. Now marketed under the trade name "Pittchlor," the product previously had been requisitioned by the armed forces as a bleach, germicide, and disinfectant. It also found wide usage in shrink resistance treatment of military woolen socks.

During the war, calcium hypochlorite was found to be especially useful in combating emergency conditions such as those found in contaminated reservoirs and water mains. It has special advantages for the chlorination of water supplies up to approximately 500,000 gallons per day, or where the daily requirement of available chlorine is approximately one pound.

Extensive civilian use is expected when abnormal conditions, such as floods or fires, render permanent installations partially or totally ineffective.

In addition to its employment in water and sewage treatment, Pittchlor finds numerous other uses in providing proper sanitation for the protection of the public. Hospitals find extensive use for it in meeting their rigid sanitary requirements. It is used for purifying swimming pool water and in cleaning the pools, for disinfecting and deodorizing locker rooms, showers, toilets, and for providing foot baths to combat athlete's foot.

Literature explaining the uses of Pittchlor is now available.

Synthetic Tan NP 267

A synthetic tanning chemical for sole leather, believed far superior to the natural product extracted from the chestnut tree, which plant disease has reduced to the verge of national extinction, has been announced by Monsanto Chemical Company.

The product, identified as Exan, was described as imparting to sole leather a fine smooth grain, as well as such desirable qualities as tightness, firmness, pliability and excellent resistance to abrasion, water and wear.

Monsanto research chemists cooperated with those of the University of Cincinnati's Department of Leather Research, the Moore Laboratory at Buffalo, N. Y., and the American Oak Leather Company at Cincinnati to produce Exan.

Surface Preparation Of Metals NP 268

The Amercoat Division of the American Pipe and Construction Co. has announced two new products supplementary to their line of Amercoat plastic coatings.

Amercoat No. 59 is a surface preparation for zinc, a treatment for galvanized metal surfaces prior to application of a protective coating.

Amercoat No. 60 is a surface preparation for copper and brass, and is a similar treatment for these metals.

These treating solutions are for use where shot or sandblasting are impractical. The resulting adhesion of the protective coating is excellent where applied over a zinc, copper or brass surface properly prepared by these methods.

Enamel Stripper NP 269

The Enthone Company has announced the development of a new stripper called "Enthone Enamel Stripper S-300" for removal of many types of organic coatings. Synthetic enamels such as alkyds, melamine, and urea-formaldehyde coatings are readily stripped with this strip-

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (3-6)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 265	NP 269	NP 273	NP 277	NP 281
NP 266	NP 270	NP 274	NP 278	NP 282
NP 267	NP 271	NP 275	NP 279	NP 283
NP 268	NP 272	NP 276	NP 280	NP 284
				NP 285

Name ..... **Position** .....

Company .....

Street .....

City & State .....

Columbia's Technical Staff Presents. . .

These are new, colorless, organic ether-esters of low volatility. They are substantially insoluble in water . . . very stable to hydrolysis by water . . . widely soluble in organic solvents . . . compatible with many resins and plastics. Their properties, some of which are listed below, suggest advantageous uses as plasticizers, high-boiling solvents and softening agents, as well as in pharmaceuticals and lubricant compositions.

PRINCIPAL PROPERTIES OF DIGLYCOL CARBONATE ETHER-ESTERS

Property	Cresyl Diglycol Carbonate	Butyl Diglycol Carbonate	Butoxyethyl Diglycol Carbonate	Phenyl Diglycol Carbonate
Formula	$C_{20}H_{22}O_7$	$C_{14}H_{26}O_7$	$C_{18}H_{34}O_9$	$C_{18}H_{18}O_7$
Molecular Weight	374.4	306.4	394.5	346.3
Physical State	Liquid	Liquid	Liquid	Solid, m.p. 40°C.
Sp. Gr., 20°C./4°C.	1.19	1.07	1.08	1.23
Refractive Index, 20°C.	1.523	1.435	1.443	1.525
Viscosity, centipoises at 20°C.	2170	21	45	1810 (Supercooled)
Boiling Point, °C.	247-248 (2mm. Hg.)	164-166 (2mm. Hg.)	200-206 (2mm. Hg.)	225-229 (2mm. Hg.)
Flash Point, °F.	475	372	379	460
Evaporation Rate at 100°C. mg./sq. cm./hr.	0.006	0.59	0.12	0.026

TECHNICAL BULLETINS containing additional data—are available on request to our Executive Sales Offices. If your examination of these data indicates potentialities for your products, you may obtain samples of any of the Diglycol Carbonates at no charge.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY • COLUMBIA CHEMICAL DIVISION

FIFTH AVENUE at BELLEFIELD • PITTSBURGH 13, PENNSYLVANIA

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per. The product can be used for removing these and other coatings using full strength at room temperature; it is also a powerful stripper when diluted with water and the mixture heated in the temperature range of 150-180°F.

Enamels are stated to be removed cleanly by a wrinkling action, leaving the work clean and bright. There is no attack upon the base metal and such active metals as aluminum, zinc, and tin are unharmed. Phosphate coatings and anodized coatings are also unharmed by this stripper.

Plaster-Plastic NP 270

A treatment to produce from plasters such as plaster of Paris, a completely new, unusually versatile product has just been announced by Engineering Associates.

The product, which has been given the name "Palestic" is harder than marble, has the strength of stone, can be produced in any color, can be highly polished and is low in cost.

It is stated that no greater skill is required than is necessary to mix and pour plaster. The process for making "Palestic", involves no special equipment nor facilities.

This new material can be used to advantage and economy in place of plaster and of many plastics for a variety of purposes such as for novelties, decorative effects, and the production of industrial products. Further, it can be employed in many instances where plaster would be entirely unsuitable and where plastics would be too expensive. It fills a long sought need for an inexpensive, easily handled product having properties and attributes midway between those of stone and plastic.

It is now being considered for a number of industrial products including drawing forms, patterns, instrument bases, containers, clock and radio cabinets and display racks. "Palestic" can be securely adhered to other plastics such as Lucite or Plexiglas, styrene, cellulose acetate, and Bakelite, as well as to metals, wood, and glass; and can, therefore, be used with these materials in fabrication of a wide variety of products.

"Palestic" is about ten times more resistant than plaster to penetration by water. It can be sanded, sawn, polished, and generally handled like a plastic.

Aromatic Chemicals

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THE field of Aromatic Chemicals in Industry has widened considerably in recent years.

NO longer is the use of Aromatic Chemicals restricted to the Soap, Cosmetic and Perfume Manufacturer.

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FURTHER research is constantly being made by us to improve and widen our lines of Aromatic Chemicals.

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Among our many products the following are proving useful in numerous industries:

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Lignin Vanillin
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GENERAL DRUG COMPANY
125 BARCLAY STREET NEW YORK 7, N. Y.
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Non-Ionic Wetting Agent NP 271

Alrose Chemical Company has announced a new product, tradenamed "Nonisol". It is a non-ionic, ester-type surface active agent, which is miscible with water in all proportions, also with most organic liquids including Stoddard solvent, pine oil and chlorinated hydrocarbons. It is not very soluble in mineral oil. It is compatible with soaps and other anionic or cationic wetting agents. The new product is not affected by water hardness and has a dispersant action on lime soaps. Its stability is satisfactory in dilute organic acids, mild alkali and in metallic salt solution. It is heat stable by itself, but unstable in the presence of strong mineral acids or alkalies. It is an especially valuable wetting agent for textile fibers and materials. It is a versatile emulsifying agent, capable of producing water-in-oil as well as oil-in-water emulsions, which are stable in hard water and in the presence of salts, according to the company's statements.

Laminating Resin NP 272

Bakelite Corporation has announced a radically new type of laminating plastic known as the C-5 Resins. The first of these, designated as Bakelite C-5 Laminating Resin XJ-17694, is designed specifically as a surfacing material for decorative laminates.

The new resin, which is entirely different from any commercially known type of synthetic plastic, has a number of properties and characteristics heretofore unobtainable. In physical form, XJ-17694 is a xylene-toluene solution with a resin content of 50 per cent. It is rated number 10 on the Gardner Color Scale with a viscosity reading of 15 to 18 centipoises, specific gravity of approximately 1.0 and a flash point of 45 deg. F.

The C-5 Resins are highly versatile, in that wide latitude of molding tempera-

tures and pressures is practical. This versatility extends to the methods by which the resin surface may be applied.

In view of the extreme novelty of the material the full range of applications is not yet definite. However, proposed applications include rigid structures such as table tops and wallboards which have cores of phenolic plywood or asbestos fiber. The excellent flexibility characteristics of the new resins show great potentialities for shaped articles such as wallboard moldings, instrument cases and the like.

Resin Glaze For Chintz NP 273

Production of durable glazes on chintz through the use of melamine-formaldehyde resins has been announced by the American Cyanamid Company's Textile Resin Department.

Through use of these resins it is now possible to obtain high gloss glazes that will withstand even such severe treatment as boiling for a half hour in soapy water, according to American Cyanamid. These new melamine resin glazes are also immune to dry cleaning processes. Another highly important effect of the treatment with melamine resin finish is to control shrinkage, usually limiting shrinkage of resin finished chintz to less than 2 per cent in length or width. This means that the new chintzes will be completely washable without loss of characteristic glaze and without noticeable shrinkage.

Porcelain Enamel NP 274

The O. Hommel Company, of Pittsburgh, has announced the development of a new porcelain enamel, "Tite-Wite." According to Mr. Ernest Hommel, president, it will make possible the use of porcelain enamel on many additional products that have heretofore not been finished with that material.

Tite-Wite is an opaque white cover coat available in both regular and acid-resisting porcelain enamels. It can be applied nearly as thin as the best organic paint finishes. Tests show reflectance readings of 75 to 80% and over when applications of 15 to 20 grams per square foot are applied. Previously it was necessary to apply from 2 to 3 times as much, which increased the chipping hazard.

Pre-Catalyzed Plywood Resin NP 275

Development of a pre-catalyzed urea formaldehyde resin for hot press plywood permitting high extension with flour and thus providing glue line costs as low as soybean and vegetable glues has been announced by the Resinous Products & Chemical Company. Known as Uformite 501, the resin eliminates the troublesome factor of adjusting the type and amount of catalyst necessary to accommodate various degrees of flour extension.

The resin is water resistant and insures an accurate and adequate catalyst ratio with a one component adhesive. The pH of the cured film is 4.0 or higher. The resin is a tan-colored, free flowing powder and is readily dispersible in water.

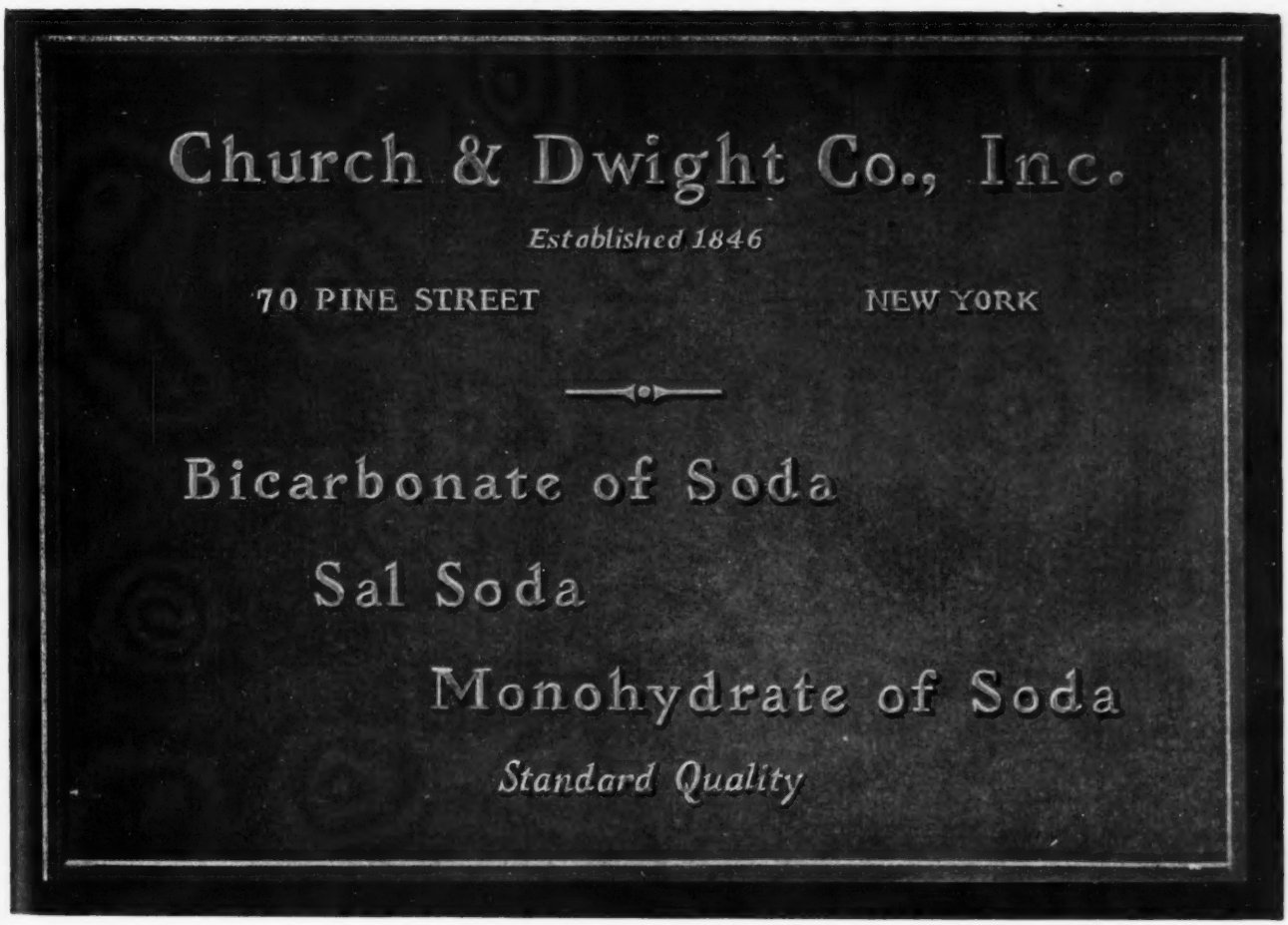
The catalyst content of the resin provides adequate cure in both unextended and highly extended hot-pressing mixtures. No additional catalyst is required, nor should any be added in the mixing process.

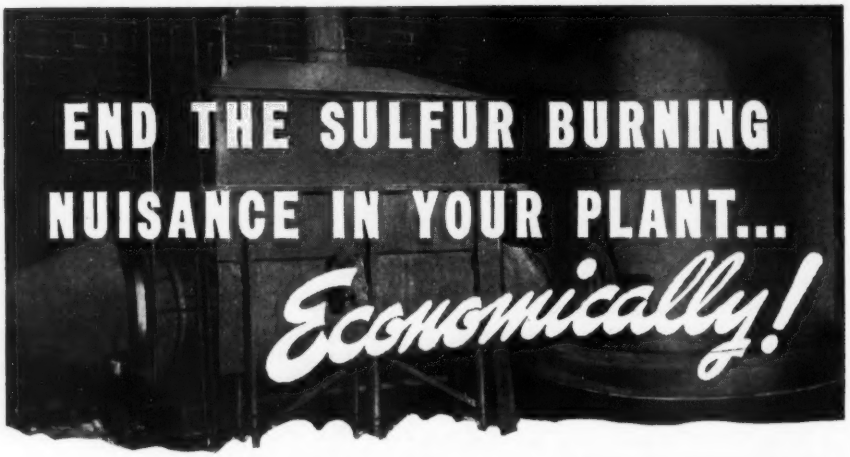
Glass-Reinforced Plastic NP 276

A glass-reinforced plastic material that possesses greater strength than the structural metals, that will not corrode, that is dimensionally stable, and that can be fabricated without costly dies, has been announced by Owens-Corning Fiberglas Corporation.

In an effort to develop a strong, lightweight material needed by the Army Air Forces, fine glass fibers were used to reinforce plastics much as steel rods are used to reinforce concrete. The result was a material widely used in military aircraft parts and equipment, and in other military applications. Many peace-time applications are foreseen, both in the construction of civilian aircraft and in other fields.

Because the low-pressure resins used in combination with the glass fibers polymerize without giving off volatiles, it is possible to cure them in any desired shape merely by holding them in contact with the mold. This makes it possible for





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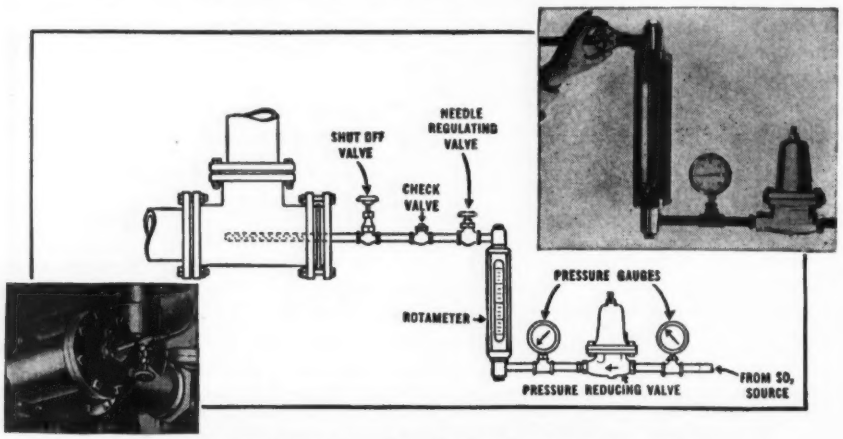

An Easy-to-install Ansul SO_2 System gives you these Four Important Advantages

GREATER ECONOMY—Small investment in equipment, materially reduced operating and maintenance costs, and freeing of valuable floor space.

FINGER-TIP CONTROL—Easy, positive, finger-tip control providing extreme accuracy for reaction or adjustment of pH.

HIGHER PURITY—Elimination of impurities inherent in burner gases (Ansul Liquid SO_2 is 99.9+% [by weight] PURE).

GREATER SOLUBILITY—Solubility in water is 4 to 5 times greater than SO_2 from burner gas.

WRITE THE ANSUL TECHNICAL STAFF FOR FURTHER INFORMATION

LIQUID Sulfur Dioxide ANSUL

PHYSICAL PROPERTIES

Chemical formula	SO_2
Molecular weight	64.06
Color (gas and liquid)	Colorless
Odor	Characteristic, pungent
Melting point	−103.9° F. (−75.5° C.)
Boiling point	14.0° F. (−10.0° C.)
Density of liquid at 80° F.	(85.03 lbs. per cu. ft.)
Specific gravity at 80° F.	1.363
Density of gas at 0° C. and 760 mm.	2.9267 grams per liter (0.1827 lb. per cu. ft.)
Critical temperature	314.82° F. (157.12° C.)
Critical pressure	1141.5 lbs. per sq. in. abs.
Solubility	Soluble in water
Purity	99.9+% (by wt.) SO_2 (H_2O less than 0.01%)

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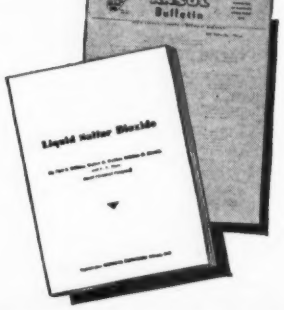


Send for Bulletin 020.1, "A Comparison of Ansul SO_2 and Sulfur Burner Gas," and also for your copy of "Liquid Sulfur Dioxide"—a treatise on the properties, characteristics, and industrial uses of Liquid Sulfur Dioxide—written by the Ansul Technical Staff.

WRITE: Dept. A.

ANSUL CHEMICAL COMPANY, MARINETTE, WIS.

Eastern Office: 60 E. 42nd St., New York City

fabricators to produce very large parts—the whole top of a Pullman car or the hull of a boat, for instance—without the expense and physical limitations imposed by the use of high-pressure presses.

Designers and engineers are studying Fiberglas-plastics for such products as railroad car, bus, automobile and truck body parts for boats and canoes, for luggage and furniture, for piping, for kitchen and bathroom assemblies and home appliances. Use of the material for civilian plane parts will be a natural transition from its use in war planes.

Strength properties attainable with glass-reinforced plastics are: tension, 7600 pounds per square inch; compression, 68,000 pounds per square inch; flexure, 112,000 pounds per square inch; impact, 55 foot pounds per inch of notch; modulus of elasticity, 4,000,000 pounds per square inch.

Aluminum Coating NP 277

An aluminum coating which gives lasting beauty and protection to metal surfaces with only one coat is announced by Reilly Tar & Chemical Corporation.

This new Reilly coating combines, in a one coat job, the attractive appearance of aluminum with the corrosion-resisting properties of coal tar. The aluminum pigment is thoroughly mixed into the coal tar base, and floats to the surface after application, giving a bright, lustrous aluminum finish. The coating can be either brushed on or sprayed. It will not flow during or after drying, and after drying it will not crack, check or peel on exposure to temperatures as low as minus 30° F., nor flow at temperatures as high as 160° F.

While designed primarily for use on metal surfaces which are exposed to the atmosphere, to excessive heat or moisture, chemical fumes and gases, and other corrosive agencies, Reilly Aluminum Coating may also be used on cement, tile, wood and brick surfaces. Its many applications include storage tanks for oil, gas, gasoline, and water; metal buildings, towers, stacks, radiators, pipes, fittings, metal gutters, truck and trailer bodies, tractors and other farm equipment, bridges, road markers and guard rails.

It is furnished mixed and ready for application in one and five gallon cans and 55 gallon drums.

Paint and Lacquer Recovery Process NP 278

Now released for general use, a patented process employed in war plants to recover the more than 33 per cent of the paint and lacquer normally lost in spray-booth applications is said to yield reclaimed coatings which are the equals of new paints and lacquers. The end product of the reclamation process is a water-in-oil emulsion, suitable for re-spraying, and which produces a smooth, even, dur-

able protective coating. The process is controlled by the Meckler Chemical Corporation.

Paint normally lost in the curtain of falling water is precipitated in the form of a water-and-paint (or lacquer) sludge. In the new process, supernatant water is removed from the sludge, and the solvent which has been lost by evaporation is replaced by a mixture of an emulsifying agent—sulfonated castor oil, 2-amino 2-methyl 1-propanol, or the like—and an organic solvent, or solvents, such as acetone, xylol, butanol, butyl acetate or naphthas.

The mixture is then agitated, resulting in a water-in-oil emulsified coating, ready for re-use.

Carboxyadipic Acid NP 279

Basic Flavors, Inc. announces 1,2,4-butane tricarboxylic acid (β-carboxyadipic acid), a new tribasic acid, and that it is now available to resin and plastic manufacturers. It is also suggested for pharmaceutical and organic synthesis. A crystalline solid, it is available in refined chemical grade only.

Plasticizer NP 280

"Flexol" Plasticizer TOF (trioctyl phosphate), a new and effective plasticizer, is now available in limited quantities from Carbide and Carbon Chemicals Corporation. Tank-car quantities will be obtainable later this year upon completion of a plant now under construction.

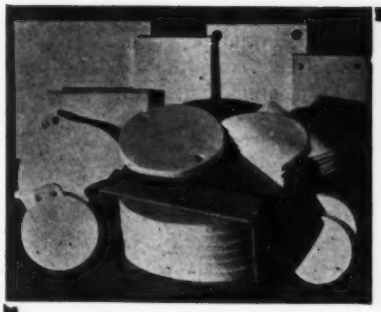
This versatile plasticizer develops four important properties in plasticized compositions—excellent low-temperature flexibility, minimum change in flexibility over a wide temperature range, high resistance to water extraction, and low volatile loss. "Flexol" Plasticizer TOF is compatible with vinyl chloride, vinyl chloride-acetate and vinyl butyral resins, and the principal types of synthetic rubber. It is also compatible with ethyl cellulose and cellulose nitrate.

"Flexol" Plasticizer TOF is useful in vinyl resin solution coatings as well as molded, calendered, or extruded compositions. It is especially effective in spreader and calender coatings for cloth where pliability and good drape are desired.

Carpet Cleaner NP 281

A new detergent for location cleaning of wall-to-wall carpeting in private homes, hotels, clubs, theatres, restaurants, retail stores, and other places where floor covering removal is inconvenient has been announced by the Mathieson Alkali Works. The product will be marketed under the trade name, Neutrotone.

The cleanser is a powder in which oxidizing agents like the hypochlorites are combined with organic detergent agents. Although it has high lathering



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properties, it is said to contain no soap. The compound is used in a water solution and applied with a rotary brush. Released dirt and soiled detergents are removed with a wet vacuum.

Neutrotone not only removes ordinary types of dirt but also disinfects, deodorizes and demoths carpeting without leaving a residue or harming the texture, color, or tensile strength of carpeting, Mathieson officials said.

Neutrotone is available from supply houses, packed in 50 and 100 pound drums. Formulations of Neutrotone and packaging and marketing plans for household usage are in the development stage.

Concrete Form Coating NP 282

A newly developed formula for Formfilm, manufactured by the A. C. Horn Company, is announced by its research laboratories. The new Formfilm allows contractors to coat the surface of plywood forms with the same thickness of film in one coat as previously obtained in two coats. The additional protection and the saving in application and handling will be welcome, particularly on large concrete jobs.

The new Formfilm is used for preparing forms, such as plywood or other fibrous wood, in which concrete will be held in proper position until setting has taken place. The proper coating of plywood with Formfilm produces smooth concrete, free from grain markings and ready for painting if desired.

Emulsion Cleaner NP 283

Phillips Chemical Co. announces its new emulsion-type cleaner, PSC, for use in power spray washers. PSC cleans ferrous and non-ferrous metals and inhibits them against rust, corrosion and hand soil. It is non-toxic and non-injurious to the skin or open cuts; requires no rinsing and will keep the washing tank clean.

PSC can be diluted with water in proportions of from 1:10 to 1:100, depending upon the type and amount of soil and the length of time rust resistance is desired. It is necessary only to wash the parts and blow them dry with air for complete cleaning and rust inhibition. PSC removes grease, oil, wax, lapping and drawing compounds of all kinds, red lead and other markings, abrasive dust, chips and filings from the surface as well as from ID and OD recesses.

PSC cleans by means of its penetrating properties and its "blanket overflow" action. PSC penetrates to the surface of the metal, breaking soil into tiny particles which rise to the top of the solution in the tank and are held in the PSC "blanket" while heavy solid particles sink to the bottom of the tank. The "blanket" may be periodically overflowed, keeping the bulk of the solution in the tank clean and avoiding the washing of other parts with soiled cleaner. In addition there is less strain on the pumps and much less possibility of clogged spray nozzles.

Fortified Glues NP 284

Fortified animal glues developed by glue manufacturers in conjunction with independent laboratories promise to add greatly to the life of furniture, musical instruments, and other wooden products exported by this country to tropical areas.

Making use of organic fungicide-bactericides and formaldehyde solutions, the fortified glues were originally created in response to wartime demands to protect glued assemblies sent to such areas as the Burma theater marked by extreme humidity and temperature.

Procedures used in preparing the fortified glues that have proved satisfactory under the most drastic simulated tropical conditions are simple for the woodworking plant to adapt. No equipment additions or changes are required, and anly two changes from the customary use of animal glue for joint work are involved. First, the usual glue solution is fortified against molds and extraneous bacteria by the addition of .5% by weight to the dry glue, of a new organic mercury fungicide-bactericide. Secondly, provision is made for pre-treating one side only of the assembly with a dilute formaldehyde solution allowing the wood surface to absorb the free moisture before joining with the matching wood surface to which a film of animal glue has been applied in the usual manner.

Yeast Process NP 285

Additional information on a new German process of manufacturing yeast by fermentation of sulphite liquor with the organism *Candida arborea* indicates that this organism may be potentially valuable in food yeast production in tropical and sub-tropical countries, since it permits use of higher temperatures for fermentation than does *Torula utilis*, the organism that is normally employed.

The sulphite liquor used by the Germans is a by-product of the manufacture of cellulose from beechwood. This by-product ordinarily is regarded as waste. The liquor remaining after fermentation and removal of yeast is used by the Germans in tanning.

Data on the process, together with diagrams and photographs, are presented in Report No. 483 (22 pages), obtainable, on order, from the OPB Reading Room, Commerce Building, or ordered by mail at $2.00 per photostat copy, or at 50 cents on microfilm. Mail orders should be accompanied by check or money order, made payable to the Treasurer of the United States, and should be addressed to the Office of the Publication Board, Department of Commerce, Washington 25, D. C.

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Propylene Oxide, diversified solvent and intermediate, is a valuable working material for a number of industries. Continued investigation will doubtless extend its applications into many new fields.

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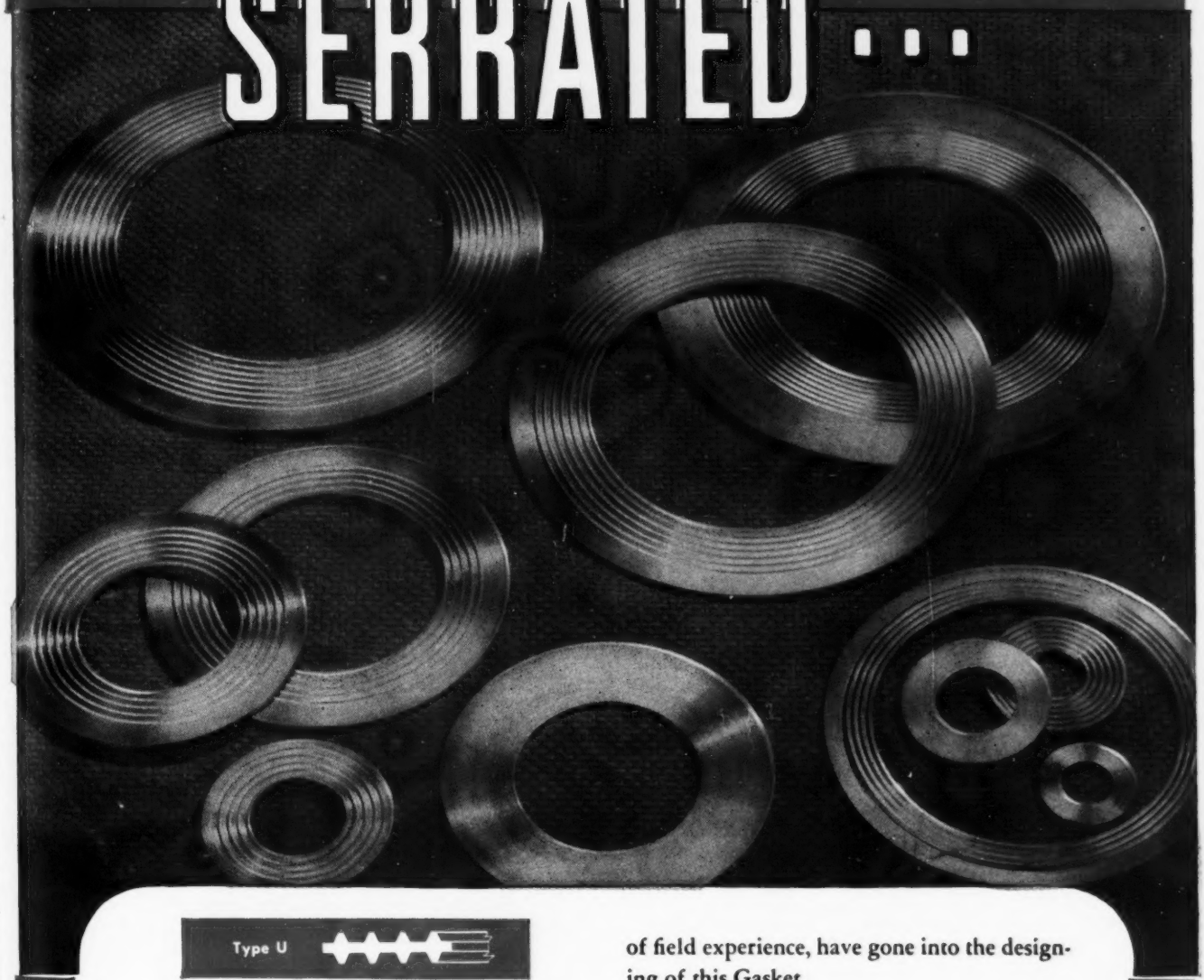
Dow will be glad to consult with you regarding this useful compound. Samples may be obtained for study in your own laboratory.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

MODERN DEVELOPMENTS OF GASKET RESEARCH

SERRATED . . .



Type U

For high pressure steam, process equipment and piping, Goetze Serrated and Profile Gaskets are growing in popularity for services requiring an all-metal gasket having high unit gasket stress at moderate bolt loads.

It is supplied in a wide range of metals and with serrations of a pitch designed to meet the individual needs of specific equipment and operating conditions.

Many hours of laboratory experiment, mechanical and metallurgical research, and years of field experience, have gone into the designing of this Gasket.

Ask to have your name added to the list of engineers receiving "The Gasket"—a series of technical bulletins containing original gasket data emanating from the Goetze Research Laboratory. Write on your company letterhead giving your position.

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Goetze for GASKETS

"America's Oldest and Largest Industrial Gasket Manufacturer"

NEW EQUIPMENT

Pressure Seal Valves QC 756

Crane Co. announces a new line of valves, designed for high pressure, high temperature steam service, primarily in the 1500 lb. and 900 lb. pressure classes, with welding ends, and embracing gate, globe and angle, and automatic stop-check valves.

The pressure-seal bonnet joint marks an important advance in design. It utilizes

the pressure in the valve to seal the joint and to eliminate leakage. Maintenance is reduced to a minimum because there is no need for pulling up bonnet joints by re-stressing the studs, either initially or periodically, as in the case of flanged bolted bonnet joints.

Inspections of the interior of valves is expedited by the ease with which the pressure-seal bonnet joint can be taken apart and reassembled. Considerably less time is required to disassemble this new type of joint and to put it together again than for any bolted flanged joint.

The reduction in weight of 1500 lb. pressure-seal bonnet valves, for example, varies from approximately 40 to 60 per cent, according to size, when compared with conventional bolted bonnet valves of similar types. This new design of valves also permits an appreciable saving in space due to the elimination of heavy flanges and also eases the problem of applying insulation.

Another important improvement is contained in a new design of disc for gate valves which has built-in flexibility. This feature eliminates sticking of the disc and requires less torque for opening when the valve is cold after having been closed while hot. These discs have Stellite facings.

The design for the gate valves insures proper guiding of the disc for the full length of its travel on the close fitting machined guide.

The body rings are also new in design —permitting straight line flow with minimum friction. They are seal-welded in place and Stellite faced.

A simple clamp, in sizes 8-inch and larger, eliminates the conventional type of construction which involves bolting the yoke to the body. The yoke is made integral with the retaining ring in sizes 6-inch and smaller.

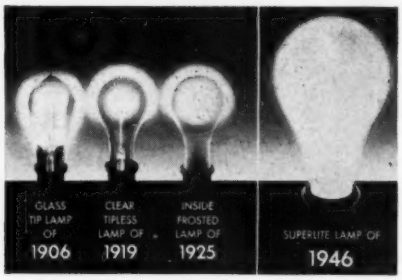
Flexible Duct QC 757

Wartime research by the United States Rubber Co. on gas masks for horses has developed a new type of flexible, corrugated duct, made of fabric, rubber and plastics, which is applicable for conveying air, dust, fumes and abrasive substances.

The ducts—called Multi-Flex—can be twisted and turned around obstructions, saving installation time required to cut and shape metal. They are easily repaired, and if accidentally crushed they resume normal shape as soon as pressure is released. They will withstand temperatures from —70° F to 350° F. They are made out of glass and asbestos fabrics impregnated with synthetic rubber and plastics. No wire reinforcements are employed. Flexibility is obtained by means of corrugations.

Light Bulbs QC 758

Wabash Appliance Corp. announces a new improvement in light bulbs. This is



their white light conditioning bulb which Wabash states is the most important development since the inside frosted lamp of 1925. By a new process the glass on the inside of the bulb is treated to diffuse the central glare point caused by the concentrated filament, resulting in the direct raw light rays being broken up into millions of softer "counter diffusing" light rays that glow evenly over the entire bulb surface, without sacrifice of visible illumination.

Wabash states that over forty million light conditioning bulbs of this type have been tested in use over the war years. Ten sizes from 10 to 200 watts will be made in 115, 120 and 125 volts, with four sizes from 25 to 150 watts in 220, 230, 240 and 250 volts.

Plug for Tank Leaks QC 759

Perma-Plug for stopping tank leaks quickly has been announced by Perma-Line Rubber Products Co.

The flange part which fits on the inside of tank is rubber covered and when

leaks occur a hole is drilled through the tank and the Perma-Plug is inserted from the inside and held in place by the stud

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (3-6)

Please send me more detailed information on the following new equipment:

QC 756	QC 762	QC 768	QC 774
QC 757	QC 763	QC 769	QC 775
QC 758	QC 764	QC 770	QC 776
QC 759	QC 765	QC 771	QC 777
QC 760	QC 766	QC 772	QC 778
QC 761	QC 767	QC 773	QC 779

Name ..... (Position) .....

Company .....

Street .....

City & State .....

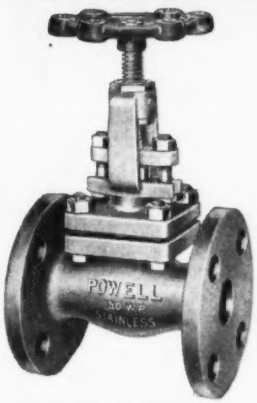
POWELL PRESENTS

...valves for *every* service in *every* PROCESS INDUSTRY

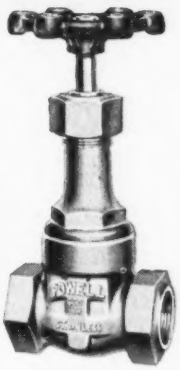
100 YEARS ago Powell started making valves for industry and today a century of practical experience and continual scientific research lies behind every Powell Valve. Twenty years ago, foreseeing the future myriad demands of the Chemical and Process Industries for valves to resist corrosive action, the Powell Special Design and Alloy Valve Division was established.

Today, after a generation of consistent building of new patterns to meet ever-changing conditions of application, Powell can offer the most complete line of designs—available in the widest range of corrosion resistant materials* ever used in making valves. In short, there's a Powell Valve to meet the most exacting demands of any service in the Chemical, Food, Textile, Paper, Oil Refining, and the other Process Industries.

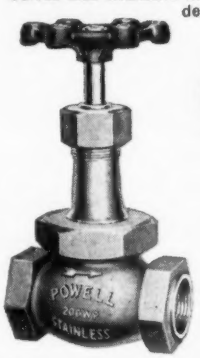
The Wm. Powell Company, Cincinnati 22, Ohio



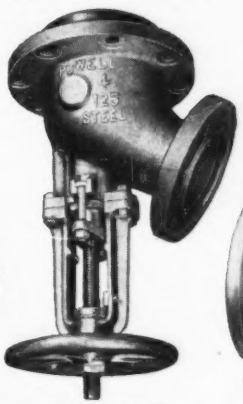
150-pound Globe Valve. Gate Valves also available in this design.



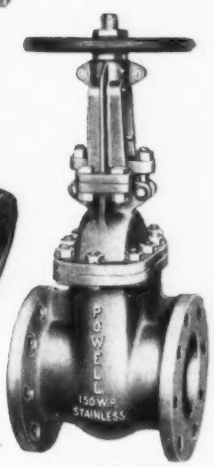
200-pound Gate Valve with screwed-in bonnet.



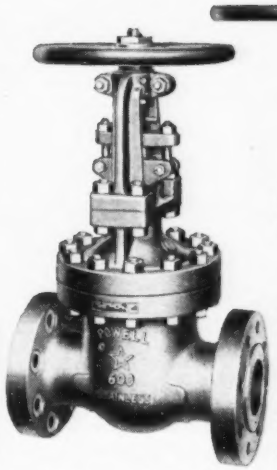
200-pound Globe Valve with union bonnet.



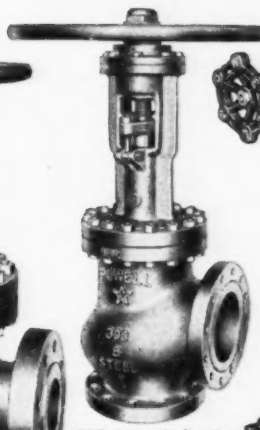
Flush Bottom Tank Valve for metal tanks and autoclaves with steam jackets.



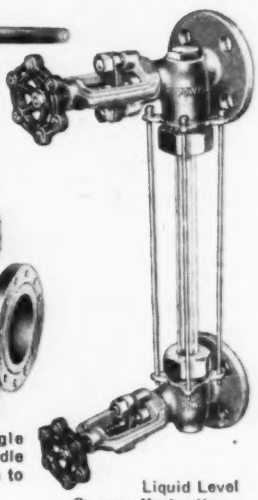
150-pound O. S. & Y. Gate Valve.



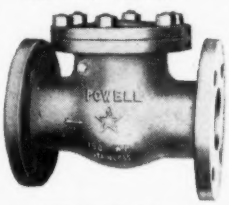
600-pound O. S. & Y. Gate Valve.



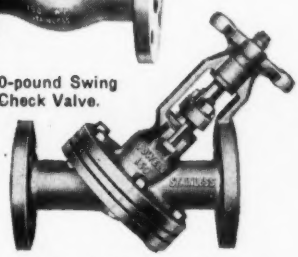
300-pound Angle Valve. Will handle temperatures up to 1400 F.



Liquid Level Gauge, offset pattern.



150-pound Swing Check Valve.

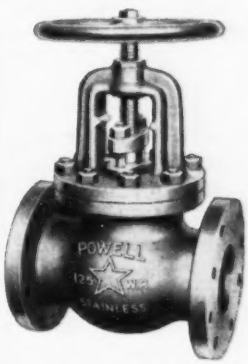


150-pound Separable Body, Reversible Seat, "Y" valve.

***Send for booklet "Powell Valves for Corrosion Resistance", available in the following Pure Metals and Special Alloys.**

Acid Bronzes	Hastelloy Alloys "A", "B", "C" and "D"	Silver (Pure)
All Iron	Herculoy	4-6% Ch. .5 Mo. Steel
Aluminum	Inconel*	18-8S
Aluminum Bronze	Illium	18-8S Mo.
Ampco Metal	Misco "C"	11.5-13.5% Ch. Iron
Carbon Steel	Monel Metal*	18% Ch. Iron
Durimet "T", "20"	Nickel (Pure)	28% Ch. Iron
D-10	Nickel Iron	25% Ch. 12% Ni. Alloy Steel
Everdur	Ni-resist*	
Hard Lead		

*Registered trade-names of the International Nickel Co., Inc.



125-pound O. S. & Y. Globe Valve

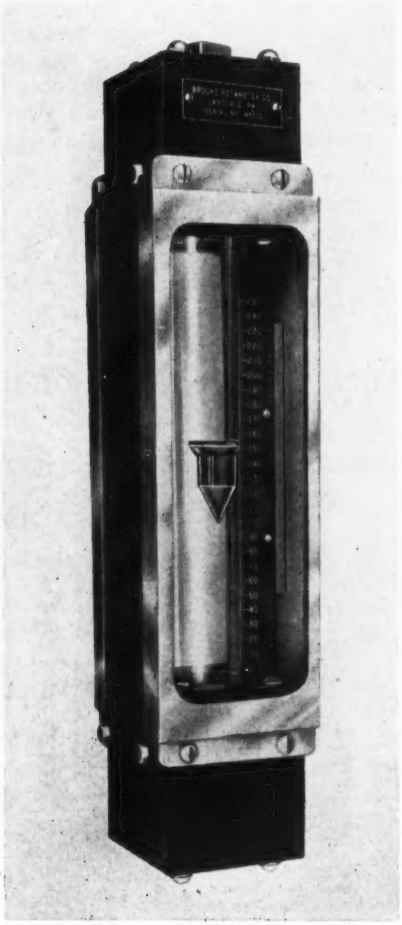
POWELL VALVES

which goes through the wall of the tank and is fastened by a lock washer and nut on the outside.

Repairs can be made in about 15 minutes, thus avoiding costly shut-downs. Perma-Plugs are covered with rubber and will outlast the tank.

Rotameter QC 760

The Brooks Rotameter Co. announces the new Full-View Rotameter with



"Safety-Shielding", obtained by front and back safety glass windows, ¼" thick, held in place by stainless steel window frames, 3/32" thick. All surfaces are gasketed to prevent leakage.

Among the advantages of the Full-View rotameter are:

1. An interchangeable "Tru-Taper" precision metering tube.
2. Replacement of the metering tube without taking meter out of the line.
3. The end fittings are universal for connections in four directions 90° apart.
4. Easy panel mounting because of the square shape of the meter.
5. A special acid and alkaline resist-steel and brass parts. All bolts, nuts, screws, and dowels as well as the front and back window frames are made of stainless steel.

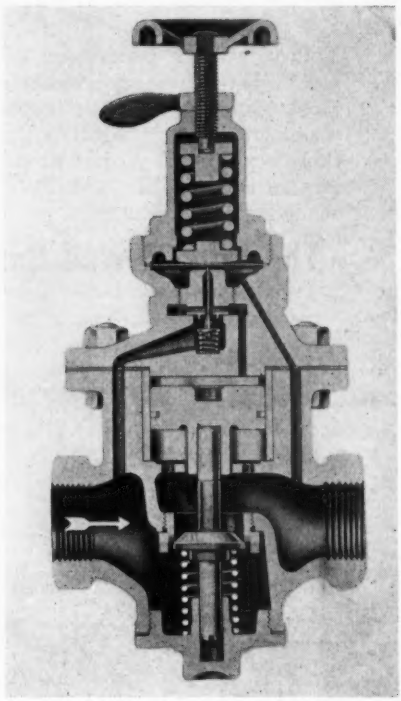
The meter is available in ⅛" to 4" sizes with screwed or flanged connections. With a metal tapered tube, it can be used for pressures that may run as high as 600 psi.

All metal parts of the brass meter are brass, and all metal parts of the stainless steel meter are stainless steel. In addition, several special materials such as Hastelloy, aluminum, lead, hard rubber, and Haveg can be furnished.

The Full-View meter can be obtained as a simple flow rate indicator or with remote instrument for recording or recording-controlling-flow rate.

Air Reducing Valve QC 761

An improved type of internal pilot operated air reducing valve, known as



Class L-1A, has been announced by Leslie Co. Among the main features are its stability under all flow conditions, and its instant reaction to wide and sudden variations in load. Plastic inserts in the valve seats provide positive shutoff and long life.

All wearing parts are renewable and complete interchangeability facilitates overhauling without removal from the pipe line. Corrosion and wear resistance are obtained by use of a stainless steel main valve, bronze controlling valve and corrosion resistant piston rings.

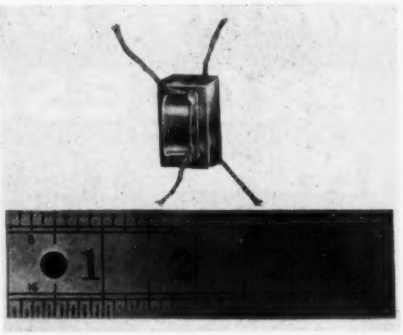
The new valve is available in ½" to 4", designed for initial pressures up to 400 psi air pressure and reduced pressures from 5-300 psi.

Small Transformers QC 762

United Transformer Corp. announces the availability of a new series of UTC Sub-Ouncers, thus far only used in military equipment. These small transformers are 9/16" x 5/8" x 7/8" and weigh only ⅓ ounce.

The coil is uniform layer-wound of Formex wire on a molded nylon bobbin, while insulation is of cellulose acetate. The leads are mechanically anchored externally and therefore do not rely on outmoded tape fastening. The core material is Hipermalloy and the entire unit is triple (waterproof) sealed.

While the bulk of sub-ouncer produc-



tion is on special units designed to manufacturers' requirements, five standard items are available for immediate delivery from stock. Frequency response ± 3 DB from 200 to 5000 cycles:

Crane Cab Cooler QC 763

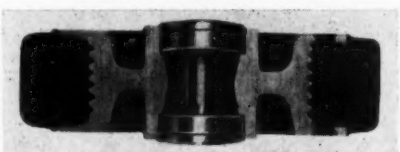
A new air-conditioning unit for crane cabs working over areas that are very hot or where fumes are present has been announced by Machinery Division, Dravo Corp.

The unit which is fitted to the top of the cab is self-contained, and requires only an electric power connection for its operation. All equipment is enclosed in a steel frame and housing. The air supplied to the cab is cooled, cleaned, and constantly circulated. Dust, smoke and acid fumes are eliminated.

Maintenance consists of the occasional changing of filters which are the standard throw-away type. The unit is designed to withstand the vibration inherent to heavy duty crane operation.

Industrial Wheels QC 764

The new war proven Grizzly Tread-Lock Wheel has been adapted for industrial use according to the Thermoid-Grizzly Wheel Sales Division. The Thermoid "Grizzly" tail-wheel shown in cross

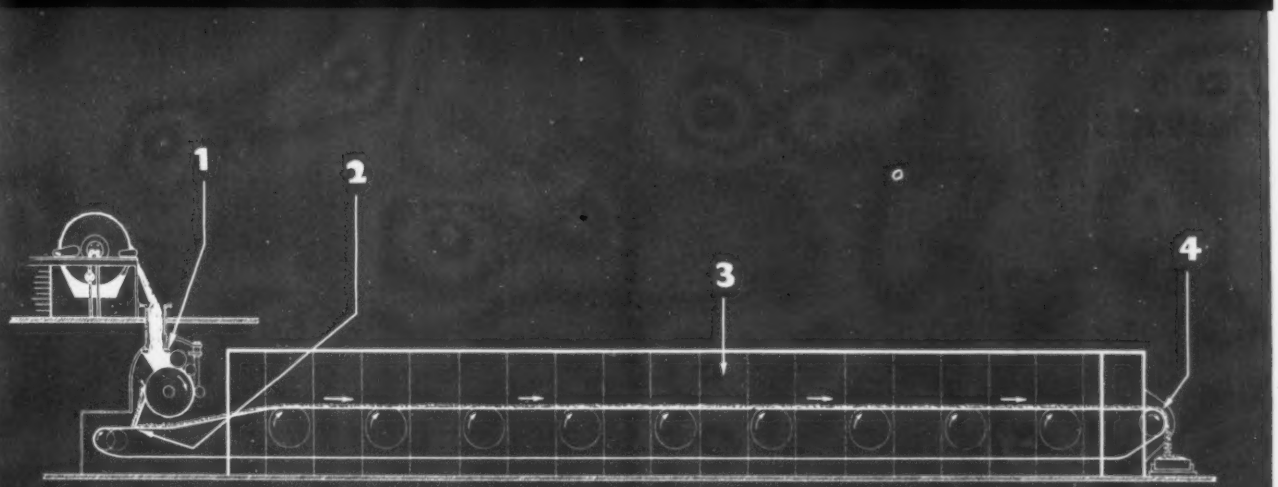


section, stood up under terrific impact, heavy loads, knife sharp edges and abrasive surfaces encountered in use on carrier-based aircraft.

The patented feature of "Sealed In Lubrication" ensures life time lubrication to the sealed precision-built bearings. Another feature is the patented "Breather" holes in the casting, which allow the rubber tire to expand under pressure, and contract when the pressure is re-

PROCTOR *Aero-Form* DRYER

with Fin Drum Feed—Speeds Output of CALCIUM CARBONATE



1. Calcium carbonate is delivered from continuous filter to hopper of fin drum feed of dryer with moisture content of approximately 110% (B.D.W.B.*).

2. Partially dried on fin drum feed, material is pre-formed, into small sticks of uniform size and thickness and discharged to conveyor of dryer.

3. Loaded to a uniform depth on moving conveyor, material passes through 9-unit dryer. Temperatures begin at 270°F. in first compartment, increase to 280°F. in second compartment and to 290°F. in third compartment.

4. Calcium carbonate, uniformly dried, is discharged from dryer with moisture content of 0.25% (B.D.W.B.), at the rate of 2,750 lbs. (C.D.W.†) per hour.

*Bone Dry Weight Basis
†Commercial Dry Weight.

Close-up of "fin drum sticks" shows form in which material enters dryer . . . allowing through-circulation.

ONE OF MANY TYPICAL APPLICATIONS FOR THIS MODERN CONTINUOUS DRYING SYSTEM

This application is but one of many, where this system is used for the continuous drying of wet-solids. In each case, the material comes to the feed hopper after mechanical dewatering. It is then pressed, by means of rollers, into the grooved surface of the internally heated, revolving fin drum which forms the feeding device. In this way, the material is dried sufficiently to be discharged, from the drum, to the conveyor of the dryer in the form of small sticks—of uniform thickness. It is then possible to circulate heated air *through* the bed of material on the conveyor and rapid, uniform, thorough drying results. This particular pre-forming and drying system may or may not be suited to the physical characteristics of your product. However, it demonstrates what we mean when we say Proctor drying systems are scientifically engineered to meet individual plant and product requirements. This system—in fact every Proctor system in operation—was installed only after it was conclusively proven in the laboratory that it was the ideal system for the individual problem. Proctor engineers may well save you hours of production time and reduce your costs materially—if you let them consider your drying problem today!

P & S

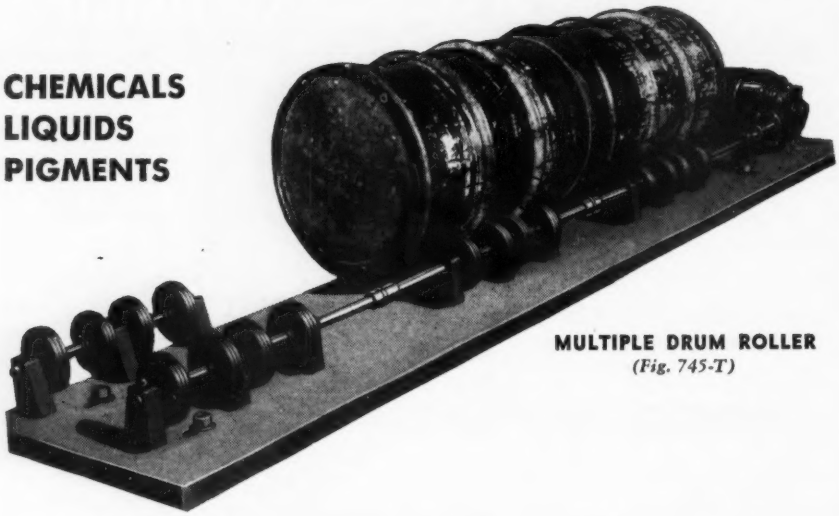
PROCTOR & SCHWARTZ · INC ·

SEVENTH STREET and TABOR ROAD · PHILADELPHIA 20 · PA ·

MIX IN SUPPLIERS' DRUMS

—a better, faster way to mix or blend

CHEMICALS
LIQUIDS
PIGMENTS

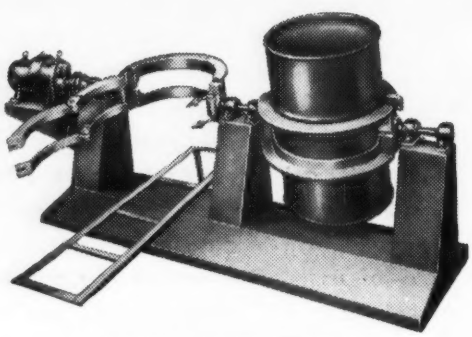


MULTIPLE DRUM ROLLER
(Fig. 745-T)

"U. S." adjustable Drum Rollers are made in standard units to handle one, two, three or four 55-gallon drums, up to 1,000 lbs. load per drum. Eight heavy-duty, rubber-tired wheels support each drum. The wheels are adjustable on the shaft to provide ample clearance for rolling hoops and bung openings. Drum speed is approximately 30 RPM. "U. S." adjustable Drum Rollers can be made to handle any size drum, barrel, or round container.

Tumbling ACTION

When tumble-mixing or churning is required use "U. S." single or multiple Drum Tumblers. It takes only a few minutes to put the drum in position, fasten the adjustable yoke, and start the tumbling action. Standard "U. S." Drum Tumblers are built to handle one, two or three 5-, 30-, or 55-gallon Drums.



DOUBLE DRUM TUMBLER
(Fig. 730-D)

New
MIXING EQUIPMENT CATALOG

Just off the press, showing complete "U. S." line of mixing equipment, including Drum Rollers, Drum Tumblers, Jar Mills, Powder Blenders, Jar Tumblers and other cost-saving equipment. Write for your free copy of Bulletin 260.

PROCESS EQUIPMENT DIVISION

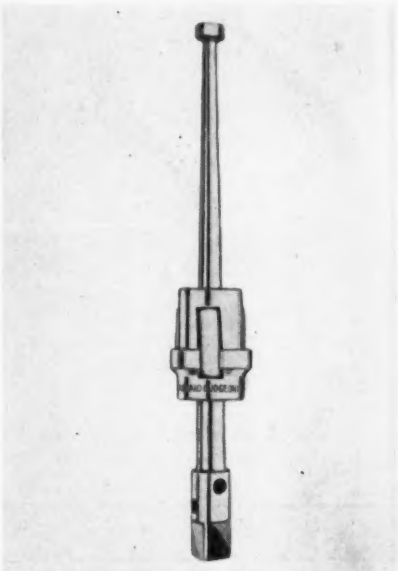
Since 1865 **U. S. STONEWARE** *Akron, Ohio*

moved. This makes for a no-bulge tire. The "Cut Resistant Tread" is tough, and will not pull apart or chunk-off under any condition.

The "Grizzly Wheel" is available in standard sizes of 6", 8", 10" and 12"; special sizes can be made to order to fit all standard axles.

Tube Expander QC 765

The Model 16 Dudgeon tube expander is designed to serve for all general boiler work, railroad maintenance, boiler making and boiler repair. The expander may



be readily dismantled and new rolls inserted. The frame holding the rolls is one piece heat treated steel. The mandrel and rolls are hardened tool steel. The rolls are extra long and reversible for double length of service. They are set at an angle with the mandrel for self-feed. Reversing the mandrel releases the expander from the tube.

Model 16 expanders are compact permitting them to work close to the boiler shell, rivet lines or tubes grouped together. They bear on the end of the tubes; do not draw tubes out of the tube sheet and roll the tube ends for their full length. They are furnished for hand or combination hand and power use.

Dryers QC 766

A new dryer for removing moisture from air lines and gas lines is announced by The Gasflux Co. Designated as the Gasflux 636 Series dryer, this equipment was originally developed to remove moisture from generator acetylene.

The largest field of application appears to be for the removal of entrained moisture from air lines. The "636" dryer has great flexibility because it is designed to use different drying media for accomplishing different degrees of moisture removal. It has also been found that this equipment is suitable for use in connection with welding and brazing operations where

RAISING WAGES TO LOWER COSTS

IN THE COURSE of expanding their Cleveland plant facilities The Hinde & Dauch Paper Company, manufacturers of corrugated boxes, turned twenty-seven years of Towmotor materials handling experience and "know-how" to their own fullest advantage. As a result, Hinde & Dauch improved their method of handling large, bulky rolls of fibre board by installing a Towmotored handling system.

In addition to solving their handling equipment problem Hinde & Dauch achieved another important improvement. Because of the new system one man operating a Towmotor unloads, transports, stacks and delivers rolls weighing 1500 lbs. to 4,000 lbs. each, totalling 90 tons per day. Since he is paid on a tonnage basis the Towmotor operator actually earns more money than under the previous method although the cost of handling has been appreciably reduced. This "pay increase" is possible because flexible Towmotor can transport and stack 3 to 6 foot long rolls anywhere in the plant without extra manual handling. In many of the other Hinde & Dauch plants throughout the country the Towmotor method has already been adopted.

For every handling problem there is an engineered solution . . . . a solution based upon Towmotor experience and "know-how" gained in solving handling problems in every industry. Send for your copy of the Towmotor Lift Truck ANALYSIS GUIDE today. Towmotor Corporation, 1237 E. 152nd St., Cleveland 10, Ohio.

TAKE IT UP WITH

TOWMOTOR

THE ONE-MAN-GANG

moisture conditions are causing difficulties.

The "636" Series dryer consists of an outer shell of 6-in. O.D. seamless steel tubing and a removable inner shell or cartridge of rolled sheet metal having a perforated metal bottom. A cast bronze head with inlet and outlet openings is bolted to a flange welded to the outer shell. Incoming gas or air must first pass downward between the inner and outer shell, thus trapping out entrained moisture, and then passes upward through the drying medium the full length of the cartridge in order to reach the outlet valve.

Depending upon the drying efficiency that is required there is a choice of three drying media to be used:

Fiberglas—This relatively new material acts as a baffle and is non-absorbent. Its action is mechanical. All entrained moisture will be removed, but not all of the water vapor.

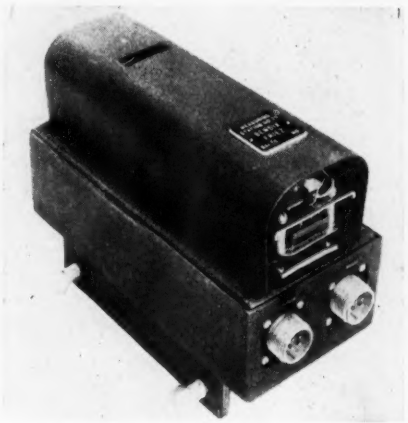
Calcium Chloride—This chemical drying medium absorbs 90% of its own weight in moisture and is at least 70% efficient. It will remove water vapor to the extent required for most uses of air and gas.

Activated Alumina—This chemical medium is the most efficient, but will adsorb only 12 to 14% of its weight in water vapor. It is recommended where absolutely dry gas or air, entirely free of water vapor, is required. After being used to capacity the cartridge can be reactivated by heating.

The 636 Series dryer may be bolted to a wall through brackets which are welded to the outer shell, or may be suspended by pipe straps. It is only necessary to leave sufficient space overhead or below to allow removal of the inner cartridge for replacement or servicing.

Humidity Recording And Control QC 767

To eliminate the covering of grease utilized to prevent corrosion of ships laid up in a "reserve fleet," the Friez Division of Bendix Aviation Corp. has developed a device to control humidity below the constant "safe" level of 30%.



The heart of this humidity detector consists of 100 human hairs—preferably blond female locks which have not had a permanent wave. They are stretched between two sensitive holders; an increase in moisture expands the extended hairs, or a decrease causes a contraction. This slight movement is transmitted to a set of controls which activate a specially designed air conditioning apparatus.

It is expected that dry storage will become a common method within the next few years and the new controller presents great possibilities for the employment of both dynamic and static dehumidification.

Gasket QC 768

Chrome Lock, an improved type of gasketing, is announced by the Products Research Co. Originally developed as a war-time substitute for rubber and other critical gasketing materials, Chrome Lock is stated to have many advantages in its own right.

According to the manufacturers, it is the only gasketing that offers adhesion to metals without cementing the gasket to the flange, assuring a positive seal. This adhesion is secured by use of an adhesive back. This makes it unnecessary to tie, lace or tape the gasket onto vertical or inverted flanges. The Chrome Lock Gasketing can be finger-pressed onto

Temperatures of ten rooms in the refrigeration plant are recorded by the Micromax Strip-Chart Recorder at which the compressor engineer is looking.

H. P. HOOD USES MICROMAX RECORDER AS "A MATTER OF ECONOMICS"

"Using that Micromax Recorder for storage temperatures is purely a matter of economics with us," says H. P. Hood & Sons, Inc., big Boston dairy and storage firm. "The Micromax, located in our compressor room, records temperatures all over our plant — from right next door, and from hundreds of feet away. It brings directly to our engineer the facts he formerly had to leave his post and go after. Now he stays by his machines, acts instantly when a temperature starts out of line. His greater promptness saves real money in holding temperatures which range down to fifty below."

For more Micromax information, consult an L&N engineer about a specific problem, or send for Catalog N-33C.

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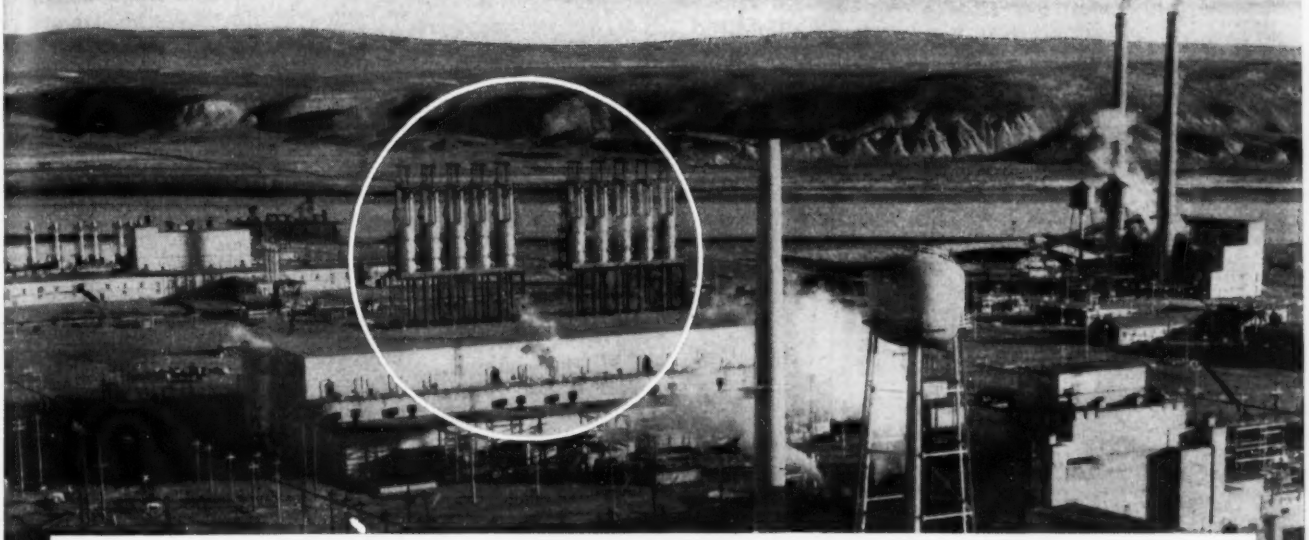
Jrl Ad N-33C-221(1a)

COCHRANE COLD WATER DEAERATORS FOR OXYGEN-FREE WATER

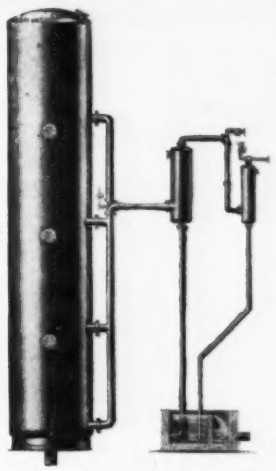


Shown in the photograph above are ten Cochrane Cold Water Deaerators, part of an installation recently made in a large plant in the Northwest.

Each of these deaerators has a capacity of over 1,000,000 lbs. per hour, for removing dissolved oxygen and carbon dioxide.

Unlike the deaeration of boiler feed water, where the high temperature aids in the process of deaeration, special equipment is required for the deaeration of cold water. Cochrane engineers have intensively studied the problems of water degasification, and have designed and built equipment varying in size from 1000 lbs./hr. to 45,000,000 lbs./hr. and from simple oxygen removal to more complicated problems involving the removal of ammonia, carbon dioxide and hydrogen sulphide.

Write for Publication 4076 "The Degasification of Water"



Above is shown a typical Cochrane Cold Water Deaerator, designed to remove oxygen and carbon dioxide from process water at a temperature below 40F°

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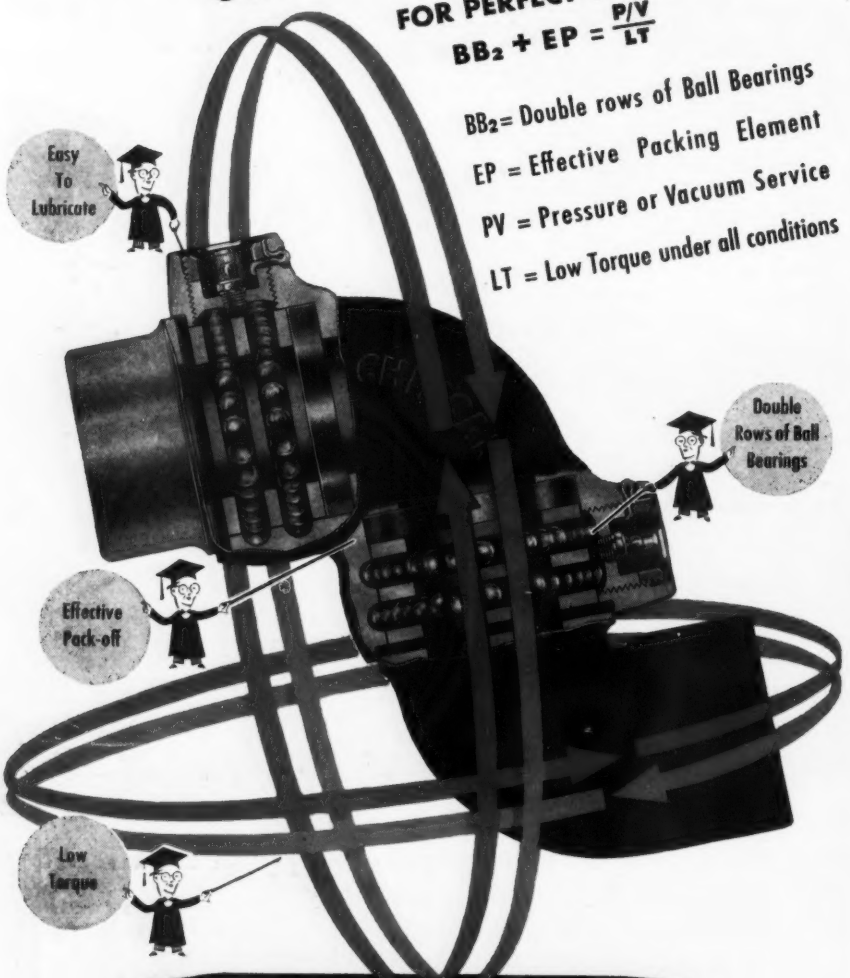
BB_2 = Double rows of Ball Bearings

EP = Effective Packing Element

PV = Pressure or Vacuum Service

LT = Low Torque under all conditions



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Chiksan flexibility is so precisely engineered that the elements which provide for easy turning and perfect seal under pressure or vacuum can be stated in a few simple symbols. This streamlined design, expressed in precision manufacture, has won world-wide acceptance for Chiksan Ball-Bearing Swivel Joints wherever movement or rotation is required in pipe lines handling liquids, vapors and gases... in aircraft... electronics ...railroads...chemical and food processing plants...refineries ...marine installations...open hearth furnaces and rolling mills...and hundreds of other applications. The new Chiksan Catalog illustrates and describes over 500 different Types, Styles and Sizes. Your Engineering Department should have a copy for ready reference.

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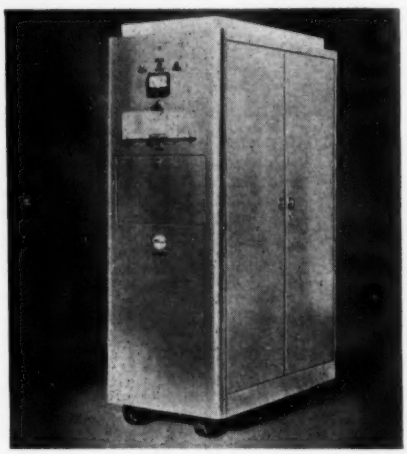
CHIKSAN COMPANY BREA, CALIFORNIA NEW YORK HOUSTON

the surface and, it is claimed, "stays put." These adhesive back gaskets have a crinolin liner upon which the template may be laid and either scribed or marked with an ordinary lead pencil. Quantities of gaskets may be cut at one time and with the liner left in place, stacked in parts bins without danger of sticking together or collecting dirt and filings. The liner also serves to stabilize the gasketing during the cutting operation.

Chrome Lock Gasketing is supplied in four types, #8 and #16 without the adhesive back and #8A and #16A with adhesive back. The gasketing is packed in both rolls and slit rolls.

Dielectric Heating QC 769

Large capacity, compactness and ready portability are among the many advantages claimed for the new Model 88XO Red Head Thermex high frequency dielectric heating unit designed and built by

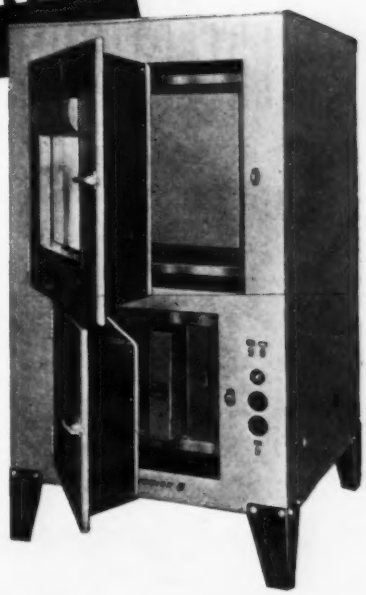


the Thermex Division of The Girdler Corp. It has an output of 5 KW delivered at approximately 20 megacycles and will raise the temperature of four pounds of average purpose material 170° F in one minute. Control is completely automatic without even a starter button to push. It is equipped with dual time controls to permit handling two jobs by the same unit, regardless of variations of the preform sizes or materials.

The 88XO Thermex Red Head requires no manual tuning during the heating cycle. Controls are behind an access door in the front panel and predetermined settings are made by the foreman or inspector and the door locked to prevent tampering and assure quality control. A green light indicates that the unit is ready for operation and the rest is production routine. The press operator loads the tray with preforms, one or several, large or small, then closes the drawer. This automatically turns on the high frequency energy and a red pilot light shows as the load is quickly heated to the correct temperature. At this point the pre-timer automatically shuts off the power and red light and the preforms are transferred to the press. The preform tray slides to

PRECISION VARI-TEMP CABINET

8 cu. ft. or 1 cu. ft. capacity Temp. range —90° F. to +220° F.



This "Precision" Vari-Temp Cabinet operates with dry ice and was designed and developed to satisfy all the cold test conditions encountered and required by present day testing techniques, from —90° F. to +220° F. The vertical cabinet design with the large door provides easy access to a spacious chamber, sufficiently large to hold the various types of apparatus used for tests. It will also accommodate the apparatus used in making the Young's Modulus test of natural and synthetic elastomers at normal and sub-normal temperatures, to ASTM D-797. The apparatus and specimens under test are readily visible at all times since there is no frosting or condensation on the surface of the observation window. The incorporation of a heating unit in this cold chamber allows a full temperature testing range of from —90° F. to + 220° F. The temperature is held ± 1° F. by individual regulators for the low temperature tests and for the high temperature tests.

FEATURES

This "Precision" Vari-Temp Cabinet is of unusually rugged construction. Special arrangement of ducts prevent carbon dioxide gas from entering specimen test chamber. Thermal losses kept at minimum. Metal plates 4" wide arranged to facilitate mounting apparatus. Insulated tubes prevent dissipation of cold from inner chamber. All temperatures are controlled thermostatically, separate thermostat for high and low temperatures. Many other unusual features.

Write for Bulletin No 10020-A. *See Your Laboratory Supply Dealer*

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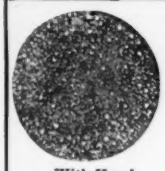
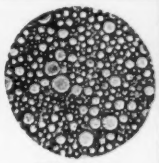
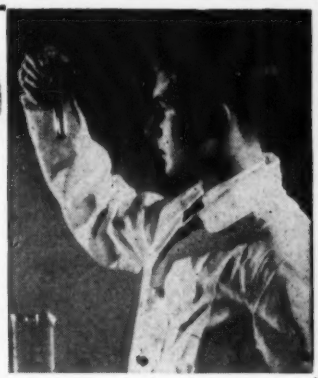


With Hand Homogenizer



With Mortar and Pestle



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Easy to operate—merely place batch in bowl (capacity 1 to 10 ounces) and press hand lever. A jet of perfectly emulsified liquid is ejected. Quickly cleaned.

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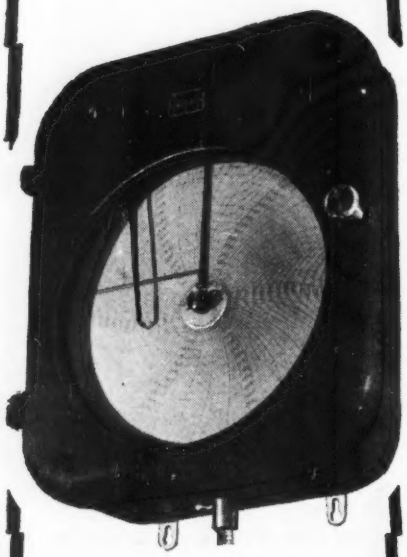

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working position or may be removed to feed multiple cavity molds.

The heavy gauge steel cabinet is 27¾" wide, 47" deep and 79" high. The built-in heating cabinet has a 16⅛", by 20½" preform tray of stainless steel which serves as the bottom electrode. The standard upper electrode is a 12⅞" by 14⅞" stainless steel screen, and other sizes are available within the effective limits of the tray's dimensions. Spacing between the electrodes is adjustable from ½" to 4½". The drawer accepts preforms up to 4½" thick. The unit operates on 230 or 440 volts, 60 cycle, three phase power supply and its tube complement consists of one 889R and six 872A's. Its net weight is 1500 lbs.

Wire Rope Clamp QC 770

A new wire clamp called Cabl-Ox has been developed by the Nunn Manufacturing Co. for securing wire rope. The Cabl-Ox clamp incorporates a new wedging action in its component parts. This is the feature of Cabl-Ox which makes it possible to hold loads in excess of the tensile strength of the rope used. The unit is alloy steel and cadmium plated for weather protection. It is made in all standard sizes from 1/16" to ¾".

Labels QC 771

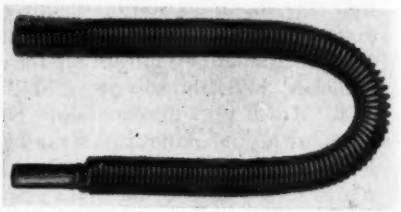
Quik-Labels have been developed to speed up and simplify the marking or coding of wires, motor leads, harnesses, circuits, conduits, relays, coils, terminal boards, fuse blocks, cables, etc. They provide permanent, legible identification, and readily stick without moistening to any round or at surface.

Pre-cut to exact size, Quik-Labels come on handy code cards always ready for instant use. Labels are peeled from the card which automatically exposes the ends of the labels, permitting them to be pulled off quickly without laborious finger picking or difficult prying of corners or edges.

More than 200 different code cards are available, including 14 colors, to meet the requirements of all types of electrical production and maintenance problems. Special code cards can be designed to meet specific situations.

Flexible Tubing QC 772

The Seamlex Company, Inc., announces the development of stainless steel seamless flexible tubing. The deep helical convolutions are shown in cross section in the illustration while the other end shows an integral cylindrical extension suitable for attaching flare-type fittings.



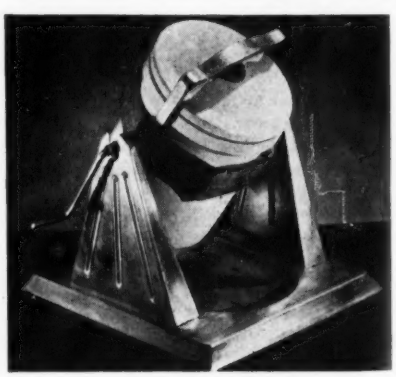
The tubing is usually provided with metallic braid jacket to take care of internal pressure requirements while any type of end connection can be furnished and standard sizes range from 1/16" I. D. to ¼" I. D. Larger sizes are in preparation.

Conveyor QC 773

A lightweight roller-type gravity conveyor made of magnesium is again being manufactured by the Jervis B. Webb Co. Their 10-foot portable unit weighs only 68 pounds as compared with its steel predecessor's 160 pounds, and yet has the same strength as steel. The conveyor can be used as a single section or may be very easily combined in multiple units. Its ease of handling is such that one man can set up or take apart 50 feet of conveyor in one minute.

Tumbling Jar QC 774

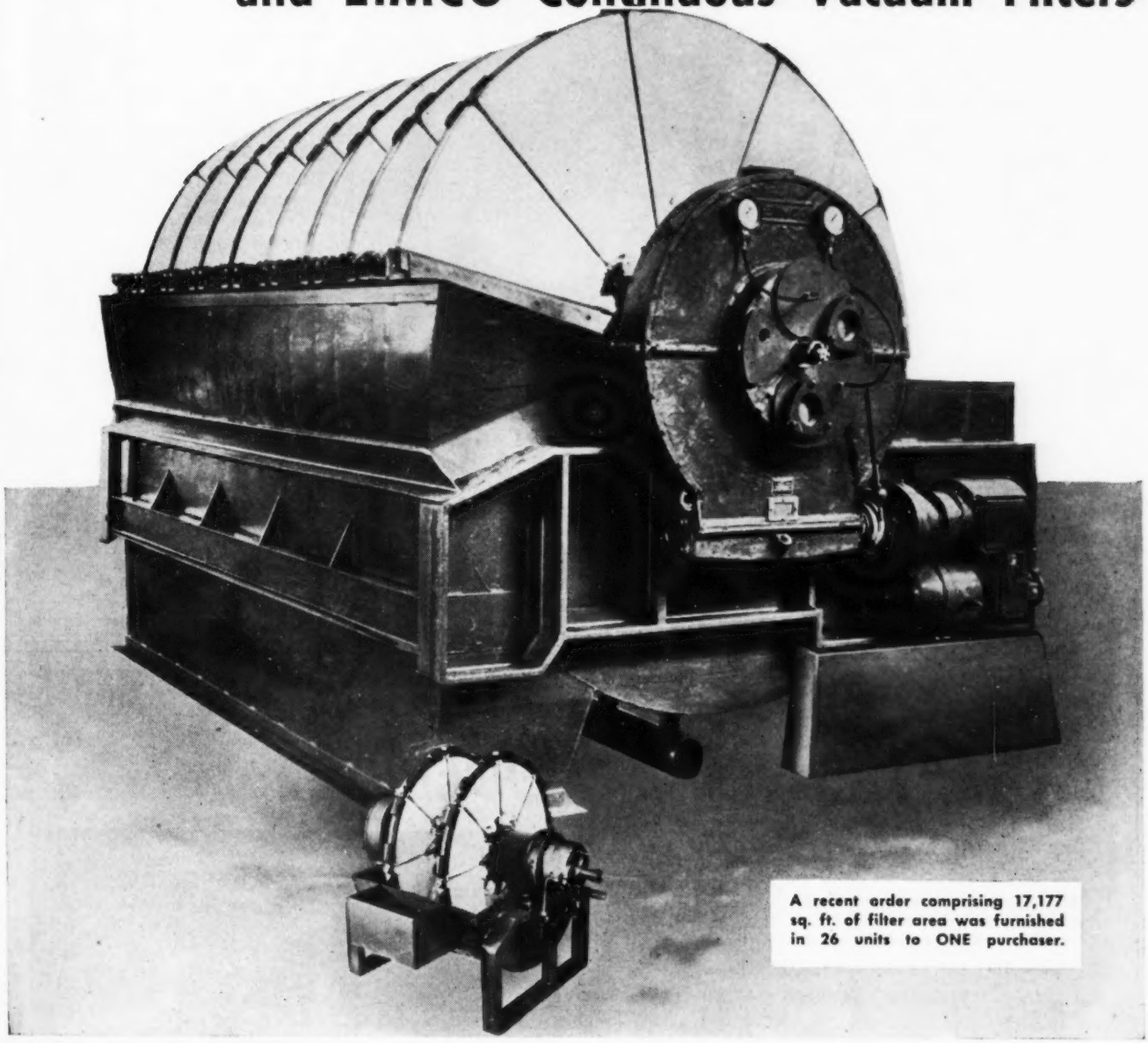
Announcement is made by Andrew Technical Service, 111 East Delaware, Chicago (formerly American Technical Company), of an improved hand-driven Tumble Jar unit, applicable to laboratory tests in connection with textiles, foods, and chemicals.



The unit consists of a chemical stoneware cylindrical jar, 6" diameter by 8" high, with reinforced rim, rubber gasket, ceramic cover, metal cover clamp for

Specialization

and EIMCO Continuous Vacuum Filters



A recent order comprising 17,177 sq. ft. of filter area was furnished in 26 units to ONE purchaser.

The Chemical Process Industry is highly specialized — each step in the production of Chemicals is exacting and the equipment used must in most cases be especially designed and engineered. EIMCO specializes in the manufacture of Drum and Disc type Continuous Vacuum Filters — and through the application of a broad experience and "on-the-ground" study of chemical process problems has furnished hundreds of filtration units to the Industry from the small laboratory filter with two (2) square feet to massive single machines with 2400 square feet of filtering area. EIMCO specialization insures quality of material and workmanship, efficiency with low initial and maintenance cost.

EIMCO Engineers will welcome an opportunity to consult with you on your filtration and dewatering problems. There is no obligation. Our Branch Offices in New York, and Chicago, and factory in Salt Lake City have well equipped labs in which a sample of your material may be tested for filter recommendations. This service is free — write for instructions on shipping sample.

EIMCO

THE EIMCO CORPORATION

Executive Offices and Factories: Salt Lake City 8, Utah
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109

leak-proof closure, mounted on a sheet metal base with crank to permit rotation by hand. As the opening is the full diameter of the jar, filling, emptying and cleaning is facilitated. With bearing surfaces of brass against steel, there is no danger of sparking; hence the unit is perfectly safe for handling inflammable solvents or materials.

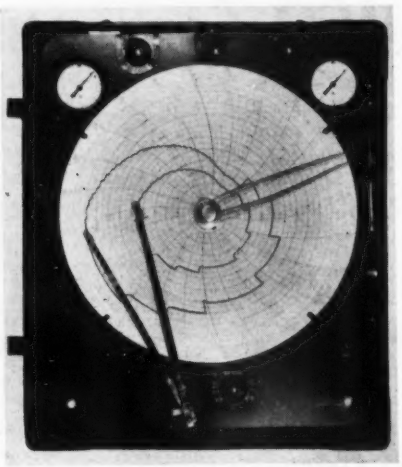
These units are now a part of Quartermaster Corps test methods for fabrics, suitable for inducing certain mechanical action to test swatches for doing small scale dry cleaning tests, and for small scale application on both Type I (aqueous) and Type II (solvent) retreating water-repellent.

The overall dimensions are 13½" x 13½" by 15" high. Motorized units are available.

Flow Ratio Control QC 775

Flow ratio control by means of the Rotameter type of instrument is fundamentally very straightforward. The Rotameter operates at constant pressure drop with flow restriction area varying in proportion to flow rate and thus the flow scales of the Rotameter are linear. With this predictable flow characteristic, there are no complications involved in characterizing two Rotameters for accurate flow rate proportioning.

Two remote reading rotameters are used in the Fischer & Porter ratio control system; one meter on each of the two lines to be proportioned. These instruments transmit their flow readings electrically to a remote dual receiving instrument. The receiving coils are enclosed in a single instrument case and a record for both instruments is made on a single chart. A ratio mechanism con-



nects the two pen linkage systems and a pneumatic pilot unit having 150% throttling range adjustment and automatic reset is tied into the system. A diaphragm motor valve located in the secondary or controlled percentage flow line operates from the pilot to control the flow in this line in a conventional manner. The ratio percentage selection is made by a simple adjustment of a ratio knob calibrated from 5:1 to 1:5.

Riveting Hammer QC 776

A new line of pneumatic riveting hammers is announced by the Ideal Commutator Dresser Co.

Its features include perfect balance, hand fitting grip design, ease of operation and controllable speed. The barrel is of one piece, all steel construction with a reinforced end to take piston impact without breaking. The piston is made of hardened alloy steel for heavy service. The valve block and sleeve valve are made with large wearing surfaces for longer tool life and minimum maintenance.

An air throttling regulator valve included with every hammer, permits very fine adjustment to accommodate all kinds of riveting, even on plain or heat treated alloy aluminum, brass or soft iron. When used with the proper tool, the Ideal "Air-Horse" is also suitable for caulking, scaling, chipping and other work. A beehive retainer spring is easily screwed on with the fingers. It is available with offset or grip handle in three sizes for light, medium or heavy riveting.

Dielectric Heater QC 777

A new standard 2 kw (output) dielectric heater which operates on a frequency of 27 megacycles is the first of a complete line to be offered in 1946 by the Allis-Chalmers Mfg. Co.

Designed for simplicity of control and ruggedly constructed for continuous industrial duty, the new heater employs

★ THE NEW MODEL JN ★

4-station automatic { VOLUME FILLER / VOLUME PACKER / GROSS WEIGHER

FOR ALL TYPES OF
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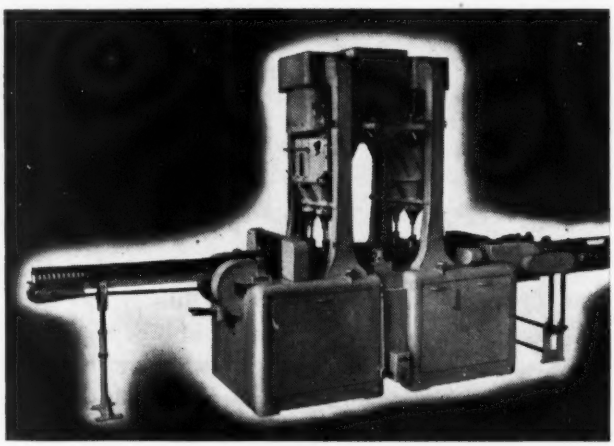
The new model JN is a *fully automatic* filling machine that packs, or packs and weighs automatically. It can be adapted easily to handle jars, bottles, cans, cartons or other rigid containers.

With many added automatic features (such as vacuum dust collecting system) plus speed and accuracy, *the new JN* will soon pay for itself through savings in labor costs alone.

A manufacturer of dental powder reports that the model JN in his plant fills and packs 120 containers per minute—accurate to within ⅛ ounce.

It will pay you to investigate the many dollar-saving features of the JN. Write *U.S.* today for complete information.



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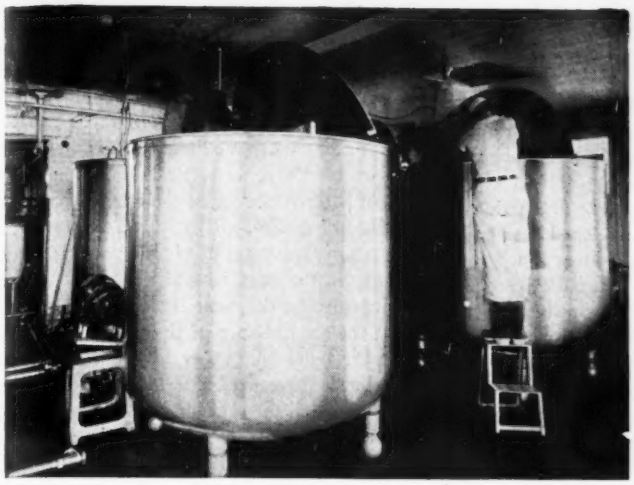

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STAINLESS STEEL

Monel Metal Aluminum
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Special Equipment built to specifications for new and unusual scientific and industrial purposes.

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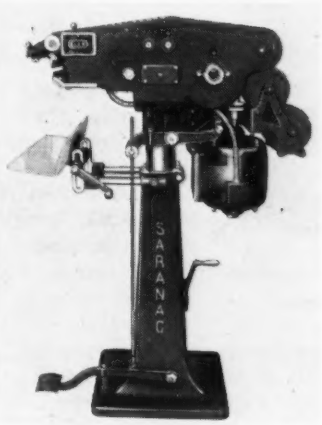
BAG SEALERS

For rapid, economical closure of all kinds of Paper Bags . . .



Saranac Model D-10″ Standard Bag Sealer

- **Glassine**
- **Cellophane**
- **Burlap with lining**
- **Bags with one or more liners**

Fine Chemicals *can't* ESCAPE The Saranac Closure is *siftproof*

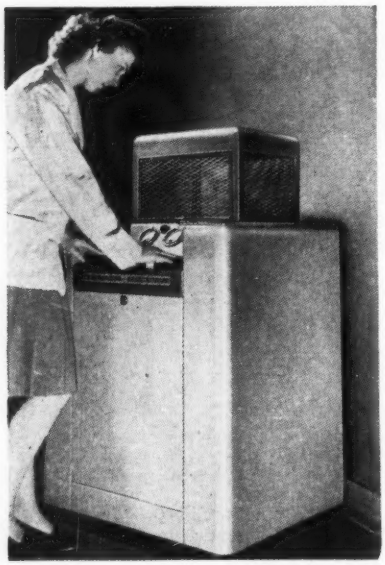
Rough handling won't affect the tight closures made with a Saranac. The strong, double reverse fold keeps chemicals where they belong — in the bag!

Folding and stapling are combined in one easy, simple operation on the Saranac D-10″. One operator does all the work, at an average daily output of 600 to 800 closures per hour. Staples are formed by the D-10″ from low-cost, standard wire coils.

Write today for Bulletin CI-154 and get full details about Saranac's economical licensing plan for Bag Sealers.

SARANAC MACHINE CO
BENTON HARBOR, MICHIGAN

proven circuits and methods. The frequency can be varied through a wide range by a front panel control and an



automatic timer controls heat sequences from two seconds to 20 minutes as selected.

An oven, containing eletrodes easily set up for any desired application, is completely shielded to eliminate undesirable radio frequency radiation. Filament of the long-life oscillator tube with simplified forced air cooling is protected by a time delay relay. Added protection is provided by an overload plate current relay.

Industrial casters make the 30 by 25 by 37 inch two-tone grey cabinet semi-portable and interlocks on all doors provide complete protection for operators.

Preheating for forging and curing of practically all types of plastics, gluing, drying and curing wood, processing of rubber and synthetic materials, sterilization of foods and medical supplies, drying and heat treating of textiles, processing of chemicals during manufacture, and defrosting frozen foods are but a few of the applications anticipated for this type of heating.

One-Man Truck QC 778

The new "Handy" steel all-welded truck, especially adaptable for operation in close quarters, is announced by Schmidgall Manufacturing Co.

The large carrying platform and slightly curved bands make this truck practicable for any type of trucking in industrial plants. It is designed for handling barrels, kegs, sacked material as well as boxes of crates. Balanced design places load on the wheels, not on the trucker, and the single handle makes the handling of bulky and heavy loads with one hand possible.

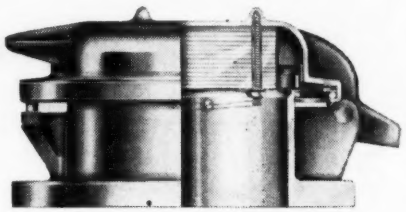
Capacity is 500 lbs. Frame ⅛" x ½" x 1¼" channel iron. Steel, all-welded construction. Large steel platform plate 14" x 9" x 3/16".

Vent Valve QC 779

A new vertical vent valve, Model H (VVH), embodying improvements on the older VVC valve has been announced by Black, Sivalls and Bryson, Inc.

The sealing medium in this pressure-vacuum valve is a flexible neoprene or synthetic rubber gasket of patented "cantilever" design. Right up to the set pressure of the valve, use is made of the pressure in the tank to seal the valve. When pressure in the tank lifts the valve cover at the set pressure of the valve, the rising cover pulls the gasket from the body, and relieves pressure from the tank. When pressure in the tank drops below the valve setting the cover falls to rest upon supporting lugs and the cantilever gasket seals the valve tightly.

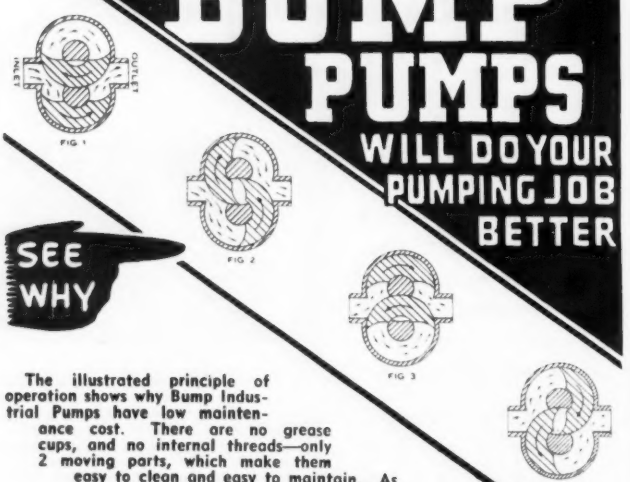
The VVH is made in sizes 2" to 24". The 2", 3" and 4" valves can be set to



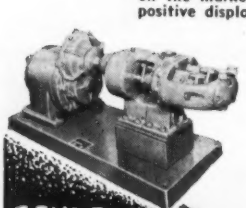
open at pressure from 3 oz. to 16 oz., while the larger valves may be set from 2 oz. to 16 oz. Pressure setting may be changed by adding or removing weights.

BUMP PUMPS WILL DO YOUR PUMPING JOB BETTER

SEE WHY



The illustrated principle of operation shows why Bump Industrial Pumps have low maintenance cost. There are no grease cups, and no internal threads—only 2 moving parts, which make them easy to clean and easy to maintain. As one company that has used a large number of Bump Pumps for years states: "They do a better job at a lower total cost to us than any other pump now offered on the market". Bump Industrial Pumps are positive displacement at any speed or pressure . . . self-priming under high vacuums or against head pressure, and deliver a constant volume per revolution, regardless of speed or pressure. Available in capacities from ½ to 400 GPM and in different models and metals suitable to the job.



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PICAYUNE, MISSISSIPPI

PACKAGING & SHIPPING

by T. PAT CALLAHAN

Packaging of Poisonous Solids

CONTINUING our series on product packaging, we would like to discuss the packaging of ICC Class B Poison Solids. All Class B Poison Solids are regulated under the Interstate Commerce Commission and the definition for this class of material is as follows:

T. Pat Callahan

Poisonous solids (including pastes and semi-solids) are substances of such nature that they are chiefly dangerous by external contact with the body or by their being taken internally as in contaminated foods or feeds.

This type of product embraces a large amount of materials shipped by the chemical industry, and if a product falls within the definition as promulgated by the Interstate Commerce Commission, it must be packed and labeled in conformance with the regulations.

A list of Class B Poison Solids appearing in the Interstate Commerce Commission Regulations follows:

Ammonium Arsenate	Calcium Cyanide
Arsenic Acid	Potassium Cyanide
Arsenic Bromide	Sodium Cyanide
Arsenic Iodide	Dinitrobenzol
Arsenic Pentoxide	Dinitrochlorbenzol
Arsenic	Ferric Arsenate
Arsenic Sulfide	Ferric Arsenite
Arsenic Trioxide	Ferrous Arsenate
Arsenical Compounds or Mixtures	Lead Arsenate
	Lead Arsenite
Arsenical Dust	Mercury Compounds
Arsenical Flue Dust	Nickel Cyanide
Arsenous Acid	Nicotine Sulfate
Barium Cyanide	Nicotine Tartrate
Bordeaux Arsenites	Nitrochlorbenzene, *m*- or *p*-
Brucine (Dimethoxy Strychnine)	Paranitraniline
Cacodylic Acid (Dimethylarsenic)	Potassium Arsenate
	Potassium Arsenite
Calcium Arsenate	Sodium Arsenate
Calcium Arsenite	Sodium Azide
Carbolic Acid (Phenol)	Sodium Cacodylate
	Strontium Arsenite
Copper Acetoarsenite	Thallium Salts
Copper Arsenite	Thallium Sulfate
Cyanide or Cyanide Mixtures	Zinc Arsenate
	Zinc Arsenite

Poisonous Solids Class B must be packaged in specification containers only, and are not acceptable for transportation unless so packed.

In determining the correct package to be used, the physical characteristics of the product must be considered. If the material is a powder, the steel drum, fiber drum, wooden barrel or fiberboard box must be constructed absolutely siftproof, and in the case of steel drums, it is usually necessary to have an opening sufficient to remove the contents. The proper opening is also essential if the material is viscous or semi-solid. However, if the material is fused solid in a drum, and it is necessary to melt the contents before removal, a 2 inch opening is sufficient as for any liquid material.

The following specification containers are prescribed:

"(a) Poisonous solids, other than those for which special requirements are prescribed, must be packed in specification containers as follows:

"(b) Spec. 5, 5A, 5B, 6A, 6B, or 6C.—Metal barrels or drums.

"(c) (1) Spec. 17E or 37D.—Metal drums (single-trip containers). Gross weight not over 300 pounds.

"NOTE: — Because of the present emergency and until further order of the Commission, the gross weight limit may be increased to not over 375 pounds.

"(c) (2) For materials fused solid in the drum a gross weight of 880 pounds is authorized.

"(d) Spec. 37H.—Metal drums (single-trip.) Net weight not over 200 pounds each.

"(e) Spec. 10A, 10B or 10C.—Wooden barrels or kegs lined with creped-paper bag, spec. 2J. Liner may be omitted if material is not pulverized or liable to sift.

"NOTE: — Because of the present emergency and until further order of the Commission, wooden whiskey barrels, with char removed and properly recoopered, which comply with all the provisions of Spec. 10B, are also authorized. Marking is required on the head of each container, by the reconditioner, by hot branding iron, as follows:

"(a) ICC-10B.

Standard Poison Label

"(b) Name or symbol (letters) of reconditioner; this must be registered with the Bureau of Explosives and located just above, below or following the mark specified in (a).

"(c) Size of markings (Minimum): ¾ inch high.

"(f) Spec. 11A.—Wooden barrels or kegs, tongued and grooved, net weight of contents not over 115 pounds each.

"(g) Spec. 12B or 12C.—Fiberboard boxes, with inside containers which must be: Metal cans not over 25 pounds capacity each; glass bottles not over 1 gallon capacity each; fiber cans or boxes, spec. 2G; sliding-top wooden boxes, lined to prevent sifting, not over 25 pounds capacity each; or paper bags, spec. 2D. Packages containing glass or earthenware containers must not weigh over 65 pounds gross not contain more than 4 inside containers of over 5 pints capacity each. Outside containers must be not over 5,000 cubic inches capacity nor contain over 50 pounds net weight each, except as provided in paragraph 3l of spec. 12B. (See note and test.)

"NOTE:—All butt seams of all boxes must be covered with Kraft tape not less than 3 inches in width and having strength, Mullen or Cady test, of not less than 60 pounds before gumming, extending over the edges and at least 2 inches down the sides of the box. The use of other tapes of equal or superior strength is authorized.

"Tape not required on manufacturer's joint that is both glued and stitched.

"Because of the present emergency and until further order of the Commission, tape 2½ inches may be used.

"TEST:—The completed package prepared as for shipping must be capable of standing a drop of 4 feet to solid concrete without breakage of the container or any sifting of contents.

"(h) Spec. 15A.—Wooden boxes, with inside containers which must be securely closed paper bags, placed within a waterproof duplex bag, spec. 2J. Net weight of material in one outside box, not over 100 pounds.

"(i) Spec. 15A, 15B, 15C, 16A, or 19A.—Wooden boxes, with inside containers which must be: Metal cans not over 25 pounds capacity each; glass or earthenware containers not over 1 gallon capacity each; except that inside containers of not over 5 gallons each and containing not over 25 pounds net weight are authorized when only one inside container is packed in each outside container. Fiber cans or boxes, spec. 2G; or sliding-top wooden boxes, lined to prevent sifting, not over 25 pounds capacity each. Net weight of material in outside container, not over 100 pounds each.

"(j) Spec. 18B—Wooden kits lined as prescribed by spec. 2K. Net weight not over 30 pounds each.

"(k) Spec. 21A.—Fiber drums. Net weight not over 115 pounds each. Or,

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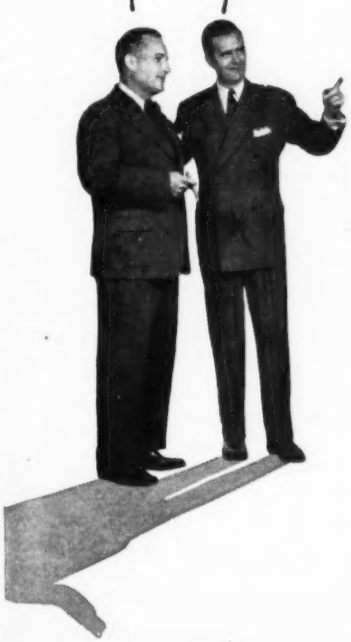

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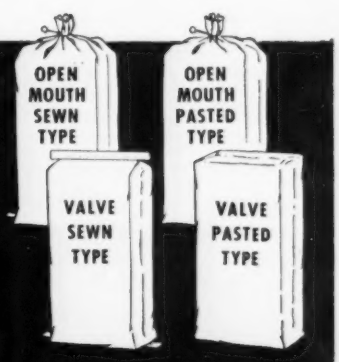

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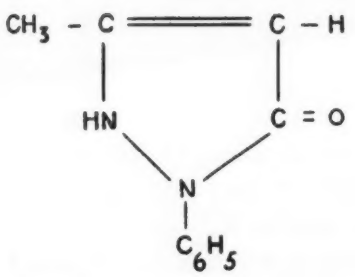

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Special Chemicals Division

WINTHROP CHEMICAL COMPANY, INC.
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because of the present emergency and until further order of the Commission, use of the following container will be permitted:

"Spec. 21A.—Fiber drums. Drums to withstand two drops from height of 4 feet in same spot or one 6-foot drop, in place of drop test as provided in specification 21A; maximum loaded capacity 225 pounds net.

"(1) Spec. 22A.—Plywood drums. Net weight not over 115 pounds each.

"(m) Spec. 103 or 103A.—Tank Cars."

These specification containers refer to most of the Class B Poison Solids. However, certain chemicals, which are on the list mentioned above, have other requirements for packaging which must be complied with. We list the materials for which additional specifications are prescribed from those quoted. Reference to the Interstate Commerce Commission regulations is necessary.

These materials are Arsenic (Arsenic Trioxide), Arsenic Acid Solid, Arsenical Compounds, Arsenate of Lead, Paris Green, Arsenical Mixtures, Arsenical Dust, Carbolic Acid (Phenol), Cyanides or Cyanide Mixtures, Dinitrobenzol, Mercury Bichloride, Paranitraniline and Sodium Azide.

Poisonous Solids Class B are exempt from all packaging and labeling requirements under the following conditions:

"(a) Poisonous solids, class B, except cyanides, other than as specified in sec. 357 (b), in tightly closed inside containers, securely cushioned when necessary to prevent breakage and packed as follows, are exempt from specification packaging, marking, and labeling requirements for transportation by rail freight, rail express, or highway, but when for transportation by carrier by water they are exempt from specification packaging, marking other than name of contents, and labeling requirements:

"(b) In inside glass, earthenware, or metal containers, or lock-corner sliding-lid wooden boxes, of not over 5 pounds capacity each, or chipboard, pasteboard, or fiber cartons, cans, or boxes, of not over 1 pound capacity each, packed in outside wooden or fiberboard boxes, or wooden barrels or kegs. Net weight of contents of outside container, not over 100 pounds.

"(c) In inside chipboard, pasteboard, or fiber cartons, cans, or boxes, of not over 5 pounds capacity each, packed in outside fiberboard or wooden boxes. Not more than 5 of these cartons shall be packed in any outside container."

If the poison is not exempt, an official poison label must appear on each outside package. It is not necessary that each package be separately labeled if the shipment is to move in carload lots direct to the ultimate consumer; but to preclude any chance that the container be shipped without the required warning, it is recommended that each unit be labeled.

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U.S.I. CHEMICAL NEWS

March ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1946

Ethyl Acetoacetate Employed Widely in Medicinal Syntheses

Used for Antimalarials, Vitamin B_1, Antipyretics and Amino Acids

Ethyl acetoacetate (acetoacetic ester) is playing an increasingly important role in the nation's health program. It is a vital intermediate in the manufacture of many of medical science's "wonder-working" therapeutics. Among the pharmaceuticals produced with the aid of this versatile compound are "SN 7618" and other antimalarials, leucine and other amino acids, antipyrine and other antipyretics, and thiamin hydrochloride (Vitamin B_1). In many of these syntheses, the ethyl acetoacetate is first converted to the sodium salt by means of another U.S.I. product, sodium ethoxide.

Antimalarials

Steadily increasing tonnages of ethyl acetoacetate are now being consumed in the manufacture of war-developed quinine substitutes such as atebrin and plasmoquin. Both these compounds have the same radical, 4-diethylamino-1-methyl-2-butylamino, attached to 3-chloro-7-methoxyacridone and methoxyquinoline, respectively. The first step in the formation of this radical is the condensation of ethyl acetoacetate with ethylene oxide.

Another antimalarial, 7-chloro-4-(4-diethylamino-1-methyl-2-butylamino) quinoline has recently been developed by U. S. scientists. Known as "SN 7618," it is claimed to be superior to quinine and all known quinine substitutes. In the manufacture of this compound, acetoacetic ester is employed in the synthesis of U.S.I.'s noval ketone (5-diethylamino-2-pentanone). This compound is vital in the addition of the side chain to the basic 4-aminoquinoline nucleus.

Vitamin B_1

In the synthesis of thiamin, ethyl sodium acetoacetate is reacted with ethylene oxide to give alpha-acetyl-gamma-butyrolactone. From this compound, either 4-methyl-5-beta-hydroxyethyl thiazole, or 2-methyl-2-ethoxy-3-chlorotetrahydrofurane is prepared. These are condensed with 2-methyl-4-amino-5-halogenomethyl-pyrimidine and 2-methyl-4-amino-5-thioformylaminomethyl-pyrimidine, respectively to give vitamin B_1.

Amino Acids

Alpha-aminobutyric acid, norvaline, norleucine, aspartic acid, glutamic acid, phenylal-

(Continued on next page)

Manufacturing Vitamin B_1 tablets. The vitamin, synthesized by the use of ethyl acetoacetate, is produced as a white powder. Measured amounts are then mixed with inert fillers and fed to the tabletting machines.

Extensive Expansion Program Ready to Be Launched by U.S.I.

Manufacturing Facilities For Insecticides, Chemicals, Resins to Be Enlarged; New Research Laboratory Projected

Plans to launch an extensive program for the expansion of its manufacturing and research facilities, which will cost not less than $7,500,000, has been announced by U. S. Industrial Chemicals, Inc. The proposed program contemplates the construction of additional manufacturing capacity at Baltimore, Maryland and Newark, New Jersey and enlargement of the Dodge & Olcott plants at Bayonne, New Jersey. The plan also contemplates participation in the construction of one or more plants for the commercialization of processes of Petroleum Chemicals, Inc.

Another significant feature of the program will be the construction of new, enlarged research laboratories at Stamford, Connecticut.

It is contemplated that the U.S.I. plants at Baltimore and Newark will manufacture the company's growing line of synthetic resins together with a wide variety of industrial chemicals. The activities of Dodge & Olcott, Inc., wholly owned subsidiary of U.S.I., will be greatly expanded in the insecticide field.

THE MONTH IN MEDICINE

A new anti-biotic is said to be effective against tuberculosis *in vitro* . . . Polysaccharides provide immunization against four of the thirty-three types of pneumonia . . . Carbon 13 throws new light on metabolic problems . . . A new synthetic antispasmodic promotes passage of kidney stones . . . A casein hydrolyzate is said to be superior to plasma for surgical shock . . . A new chemical aids in the relief of migraine and asthma . . . Whole blood is preserved for thirty days with the aid of two radioactive isotopes of iron . . . One cancer-inciter is identified as a large molecular weight protein . . . Unpleasant odors from wounds are prevented by dilute solutions of bromine . . . Varieties of penicillin are clarified on the basis of chemical structures . . . Caffeine is exonerated as the cause of peptic ulcers.

Produces Insoluble Cellulose Derivatives

The preparation of an insoluble cellulose derivative suitable for molding or extruding is described in a recent British patent. The first manufacturing stage, according to the claims made in the patent, consists of dissolving a partly acetylated cellulose in acetone and treating with a monomeric crystalline polyalkoxymethylmelamine such as N,N',N"-tris-(ethoxymethyl)-melamine.

A film of the material is then cast on a glass plate. After drying, it is stripped from the glass and heated for several days at temperatures ranging between 65 degrees C. and 160 degrees C. This produces a film insoluble in acetone. Threads insoluble in solvents are made similarly by extrusion.

New Process Reclaims Cured Synthetic Rubbers

Vulcanized rubber-like products formed by the copolymerization of butadiene with styrene or acrylonitrile can be regenerated by a method described in a recently issued patent. The method consists of comminuting the synthetic rubber, then treating it with a coal tar oil and a monohydric aliphatic alcohol. Ethyl, butyl, or propyl alcohol may be employed.

Rubber Mold Lubricant

A lubricant mixture for molds used in molding rubber is described in a recent patent. The mixture, claimed to clean as well as lubricate, contains trisodium phosphate, Turkey red oil, pine oil, an alkali metal water soluble soap, gum arabic mucilage and water.

Wool Recovery Process Claimed in New Patent

Wool can be recovered from textile materials containing a mixture of wool and cellulose acetate fibers, according to the claims made in a recently granted patent. The separation is accomplished by first immersing the textile material in a bath containing water, ethyl alcohol, sulphuric acid, and hydrochloric acid until penetration of the cellulose acetate fibers is effected. The fibers are then dried and baked at high temperatures. The cellulose acetate fibers carbonize under this treatment, but the wool fibers are unaffected.

A new patented process makes possible the reclamation of wool in wool-and-textile mixtures. Reclaimed wool can be treated in much the same manner as virgin wool. Here, the wool is combed prior to lengthening and rolling.

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March ★ **U.S.I. CHEMICAL NEWS** ★ 1946

Ethyl Acetoacetate

(Continued from preceding page)

anine, and ortho-methyltyrosine are some of the amino acids prepared by the following process. Substituted acetoacetic esters are first dissolved in 80% sulphuric acid, then treated with butyl nitrite. This produces alpha-oximino esters, which, upon reduction, yield the amino acids or their esters.

Another method for the synthesis of amino acids involves the condensation of aromatic diazo compounds with compounds of the alkylacetoacetic ester type. By means of this reaction, alanine, valine, leucine, isoleucine, and phenylalanine have been produced.

Antipyretics

Among the principal antipyretics synthesized from ethyl acetoacetate are antipyrine, and aminopyrine. In the manufacture of antipyrine, for example, acetoacetic ester is used in the formation of 3-methyl-1-phenylpyrazolone. This is accomplished by heating the ester with phenylhydrazine. Upon treatment of the pyrazolone with methyl iodide and methyl alcohol, antipyrine (2,3-dimethyl-1-phenylpyrazolone) is formed.

Other Uses

Ethyl acetoacetate is also used in substantial quantities in the manufacture of dyes of the pyrazolone, benzidine and Hansa yellow groups. In addition, the structure of this compound makes possible a wide variety of end products. Because of the reactivity of hydrogen on the carbon adjacent to the $COOC_2H_5$ group, hydrogen substitution at this point can lead to the introduction of such groups as halogen, metal, acyl and alkyl radicals. In addition, these end products have a tendency to close into various ring structures.

This is the adult female *Anopheles quadrimaculatus*, one of the three dangerous types of malaria-carrying mosquitoes in the United States. Antimalarials, made with ethyl acetoacetate as an intermediate, are helping to combat the dread disease it carries.

Ethyl Oxalate Minimizes Metal Bearing Corrosion

Recent research work carried out in India indicates that the incorporation of small amounts of oxalic acid or ethyl oxalate in blends of vegetable and mineral oils inhibits the corrosion of metallic bearings. These compounds act specifically by preventing the oxidation products of the lubricants from attacking the bearings. It is believed that this is accomplished by the formation of a thin protective film of oxalate on the metal. A mixture of ethyl oxalate and an antioxidant, such as alpha-naphthol, is said to inhibit both the oxidation of the oil and the corrosive action on the bearings.

New Process Lengthens Shelf-Life of Bacon

The use of antioxidants lengthens the time before bacon becomes rancid, according to a recently published technical paper. The process is based on the newly discovered principle that rancidity is caused by the formation of peroxides on the surface of the meat. Antioxidants, such as the following, successfully retard the development of these peroxides: nordihydroguairetic acid (NDGA), d-isoascorbyl palmitate, soybean lecithin, mixed tocopherols, and gossypol.

Plant Hormone Is Boon to Hay Fever Victims

A plant hormone which destroys ragweed, the plant responsible for 90 per cent of the country's hay fever, will soon go into large scale production, according to a recent government announcement. Known as 2,4-dichlorophenoxyacetic acid, this compound also kills common lawn weeds, such as dandelion, morning glory, thistle, and burdock without harming ordinary grass.

In addition, 2,4-dichlorophenoxyacetic acid, ripens bananas after they are picked, hastens the ripening of green apples, pears and other fruits, and makes apples cling to the tree longer than usual at harvest time. The hormone also can rid wheat fields of weeds without harming the grain, but it is deadly to cotton and some other crops.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A new degreaser, said to contain no abrasives, is recommended by the manufacturer for removing grease from glazed surfaces which might be harmed by scouring or scrubbing. It is claimed to be particularly effective on dishes, glasses, windows, pots, pans, and woodwork. **(No. 042)**

USI

To join porous with non-porous surfaces, two new plastic cements have been developed which are described as forming a permanent bond by the application of heat and pressure. **(No. 043)**

USI

An artificial leather, said to resemble genuine leather in many respects including workability, eye-appeal, and flexibility, has been announced. It is said to be suitable for the manufacture of electric razor cases, portable radios and record player cases, silverware cases, picture frames, and similar items. **(No. 044)**

USI

A new water-purifying device, claimed to operate without heat, chemicals, or electricity, is stated to produce 5 to 15 gallons of mineral-free water per hour. **(No. 045)**

USI

A new water-wash compound for spray booth water curtains is said to prevent the accumulation of lime scale, and to act as a deflocculator in dispersing pigments. **(No. 046)**

USI

A bright dip formula, said to eliminate hazards present in conventional sulphuric and nitric acid dips, is claimed to be easy to prepare, harmless to the skin, and free of offensive fumes. **(No. 047)**

USI

A new descaling agent quickly loosens and dislodges scale from evaporator tubes and coils, according to the manufacturer. It is claimed to be harmless to boiler metals, construction materials, and persons. **(No. 048)**

USI

To record high temperatures, a new type thermometer is designed to change color every 25 degrees from 500°C. to 900°C. Made of a special alloy, it is said to be particularly useful in gas turbines and similar equipment. **(No. 049)**

USI

A hand fire extinguisher with a carrying handle and control button for fast operation has been announced. It is described as containing four pounds of carbon dioxide. **(No. 050)**

USI

A non-slip surface covering is described as a weatherproof fabric coated with an extremely hard granular material which bites through oil, grease, mud, and water to provide sure footing. The covering is said to be easily applied to any clean surface by a special adhesive. **(No. 051)**

USI

An all-purpose soapless cleaner, claimed to be entirely soluble and to contain no abrasive, is said to sud instantly in hard, soft or sea water.

USI **(No. 052)**

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OTHER ESTERS
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Acetoacet-ortho-chloranilide
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Acetoacet-para-chloranilide
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PLANT OPERATIONS NOTEBOOK

Elevator Shaft Used to Shape Catalyst Particles

The nineteen story elevator shaft of the general office of the Standard Oil Co. of Indiana recently, for a short time at least, became part of the research laboratory. This occurred while it was utilized for the shaping of spherical particles of a new oil cracking catalyst. By spraying the solution of the catalyst at the top of the shaft and cooling the fine spherical particles settled to the bottom, the shaft being used as there was no tower tall enough available at the laboratory.

Fire Protection In the Chemical Plant

In a recent discussion of fire protection at the chemical plant, Mr. Allen L. Cobb, of the Eastman Kodak Co., made several interesting observations.

He noted that definite rules are not practical for the chemical plant, as each situation must be met as it arises and the necessary steps for adequate protection worked out. However, there are certain fundamentals which have been well enough established to be used as a guide and starting point.

The first of these is the necessity of safe handling of materials. Therefore, the first endeavor of safety engineers is to secure safe handling of the material during its stay in the plant.

Virtually, all chemical materials are harmless when in closed containers or while transported in closed pipe lines. The closed container has its limitations and, if exposed to exterior heat, may easily become a bomb. It is, therefore, necessary to provide adequate pressure relief, fire resistant supports and in some cases cooling means.

The provision of adequate pressure relief is by no means a simple matter. Relief valves may corrode and stick tight and usually are inadequate in size and too slow in operation to relieve the vessel contents if something suddenly goes wrong. Bursting discs are not entirely satisfactory as they can be weakened by corrosion or by mechanical injury. Also, it is obvious that the relief of a dangerous material inside a building can create many extra hazards. Although some test work has been done, and more is in prospect, actual knowledge of relief requirements are unknown beyond the statement that past practice in general has been entirely inadequate.

Whereas gravity drainage in tanks is undesirable due to the possibility of pipe being broken by fire, pumping is impractical in the handling of certain corrosive, highly viscous or highly inflammable materials. Under such conditions the least that can be done is to keep each tank of moderate size and provide a bottom outlet valve with the working parts within the tank so that they will be kept cool by the liquid contents of the tank itself and will not be damaged if the pipe connection is broken outside the tank.

In the handling of large quantities of material, common sense indicates the desirability of using fixed tanks and pipes rather than the use of portable containers which can never be adequately vented, often leak, and under fire conditions may become so many incendiary bombs.

Consideration of the possible existence of inflammable vapors leads to a somewhat different type of building than ordinarily encountered in industry. While a rugged frame is indicated, explosion venting must be provided for the building itself to relieve any explosion pressure developed.

Little is known about what actually goes on in a vapor explosion in a large building. Some practical experience has indicated that a vent ratio of one square foot of vent area to each fifty cubic feet of building volume will usually answer the needs.

The untrained engineer frequently goes to extremes in the use of explosion-proof electrical equipment and other methods to eliminate sources of ignition. It is ordinarily better so to build the plant and arrange the processes so that a bonfire can be built in the middle of the plant's most hazardous area without much chance of fire damage. Then the sources of ignition should be removed as a final measure and as an added factor of safety. Reliance upon such procedures alone is invitation to disaster. There are so many methods of ignition present that it is safe to assume that an explosive mixture is almost certain to be ignited sooner or later, except perhaps within certain parts of closed equipment.

It should also be remembered that many solid materials in the chemical industry produce explosive dusts, and here again explosion vents and special construction are in order. In particular the design of handling equipment to prevent the formation of dust clouds, and the design of building structures to prevent accumulations of dust deposits on ledges, beams and similar locations are important. With both inflammable liquids and dusts, inert atmospheres may be necessary.

After this comes the problems of materials which may explode without the presence of oxygen, which may burn more violently when wet, or which may decompose and give off dangerous gases, sometimes violently, when over-heated or otherwise handled improperly.

Many materials are new and their behavior relatively unpredictable. Mere common sense indicates that transition from the test tube in the laboratory to full plant production shall be made gradually with equipment of gradually increasing capacity.

Medical Protection in Solvent-Using Departments

Medical protection is an important factor in preventing illness and absenteeism among workers handling organic solvents. Complete medical protection includes preplacement examinations, regular medical check-ups, and facilities for prompt handling of illness caused by solvents.

A permanent clinic or infirmary may be provided. Large plants have industrial physicians in attendance. Smaller plants, which must rely on part-time or consulting physicians, have an industrial nurse to whom the workers may report at any time during the working day. The infirmary is equipped to give first aid when accidents cause severe solvent illness.

Some individuals are naturally sensitive to organic solvents; others may suffer from some disability which makes them especially susceptible to the effects of these chemicals. These individuals may become ill under normally safe conditions. They can usually be recognized by means of the pre-placement examination, however, and placed in jobs where solvents are not handled.

Regular physical check-ups on all men in a solvent-using department enable the physician to discover early symptoms of vapor poisoning, and to take steps to ensure quick and complete recovery. Continued exposure, on the other hand, may lead to permanent injury. The discovery of an ill worker also suggests investigation of the conditions of work, thus protecting other men in the department.

If caught in its early stages, dermatitis may often be treated while the affected worker continues on his job. Neglected cases may cause long absence, or transfer to another job.

Because early discovery is so important, workers should be encouraged to report immediately any signs of physical illness or skin difficulty.

The medical department functions most effectively when its work is integrated with the whole safety program, including engineering controls and safety education. Cooperation of the medical department with the safety engineer or foreman is essential. Changes in operations or in types of solvents used are reported immediately to the nurse or physician; otherwise, symptoms of illness may be overlooked or misinterpreted. Many safety departments consult with the physician before making such changes.

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Bureau of Mines

(*Continued from page 432*)

covered in monthly lists entitled, "New Publications of the Bureau of Mines."

The general catalogs include, among other publications, listings giving descriptions of special bibliographies prepared by the Bureau. For example, "Bibliography of United States Bureau of Mines Investigations of Coal and Its Products," 1910-1935, 1935-1942, contains about 2,400 titles.

Another catalog, which tells what reports are still in stock at the Government Printing Office is the Superintendent of Documents' "Price List 58-MINES, Explosives, Fuel, Gas, Gasoline, Petroleum, Minerals" which covers printed publications of the Bureau of Mines and other government agencies.

SALES PUBLICATIONS

1. *Minerals Yearbook.* The most important single publication of the Bureau of Mines is the Minerals Yearbook, which, with predecessor series, has annually reviewed the mineral industries for over 60 years. It comprises 80 to 100 chapters by Bureau specialists covering individual mineral products or mining operations of individual states. Recent volumes have run to 1500 pages.

The Yearbook is conveniently arranged for ready reference. At the beginning of each chapter there is a list of topics, followed by a summary statement and a table of "salient statistics" highlighting the year's developments. Other tables and the analytical discussions cover production of mines, smelters, and secondary sources, consumption and uses, prices, imports and exports, stocks, foreign industries, technologic developments, intercommodity competition, employment, wartime regulations, and postwar outlook. Charts depict the major trends.

Introductory chapters of the Yearbook provide a general review of the U. S. mineral industries and a 50-page statistical summary. The Yearbook has an elaborate general index and each chapter includes numerous valuable references to Bureau of Mines reports and other published sources.

Preprints of separate chapters of the Minerals yearbook are usually available some months before the bound volume appears, the separate chapters of the 1944 Yearbook being available at the present time. During the war the Minerals Yearbook was withheld from public distribution because of the confidential nature of the material in some chapters. Even then certain chapters were publicly available. However, all such restrictions have now been released and no Minerals Yearbook is on a restricted basis. Separates of most chapters of recent Yearbooks can be obtained on written application to the Bureau.

2. *Bulletins and Technical Papers*—These present the results of scientific and technical investigations. Bulletins describe major investigations completed by the Bureau or discussed major phases of extensive studies and investigations. Technical Papers are progress reports on continuing investigations and cover minor or early phases of major studies or present completed results of the less important research projects. These publications include such titles as "The Analysis of Black Powder and Dynamite," "The Titaniferous Iron Ores in the United States; Their Composition and Economic Value," "A Bibliography of the Chemistry of Gas Manufacture," and "Hydrogenation and Liquefaction of Coal." Bulletin 459 "Potash Salts from Texas-New Mexico Polyhalite Deposits", which reported on ten proposed processes for treating potash ores, included statistics of U. S. production and imports of potash compounds, 1930-1939.

3. *Economic Papers*—These are analytical economic and statistical studies of such subjects as production, consumption, sources, resources, distribution, industrial flow of mineral commodities, history of the commodity or industry, and international aspects. Included are such titles as "Trends and Seasonal Variations in Factors Influencing Domestic Motor Fuel Demand," "Potash," and "Arsenic."

4. *Handbooks and Miners' Circulars*—The Bureau publishes Handbooks which are special manuals on subjects relating to safety and efficiency. Miners' Circulars deal with the prevention of mine accidents, first aid and rescue methods, and precautions against disease. These publications are of primary importance to the mineral industries.

5. *Schedules*—These are publications which describe the procedure of the Bureau in testing equipment and materials according to its standards for permissibility as to use by the mineral industries. An example of this type of publication would be "Procedure for Applying for Tests Made on All Explosives and Blasting Devices by the Explosives Division of the Bureau of Mines."

FREE PUBLICATIONS

1. *Annual Reports of the Director*—These reports give a general review of the activities of the Bureau during the fiscal year and describe work at experiment stations and field offices. They are important for getting a panoramic view of the activities of the Bureau and for assessing trends in its activities.

2. *Reports of Investigations* — These consist of short papers which present the principal features and results of minor investigations or of special phases of major investigations. They are usually issued in advance of Bulletins and Technical Papers. The purpose of these reports is to make quickly available to industry and the public the salient results of original investigational work by the Bureau. These technological studies often present general reports of progress in the various fields or cover special topics like "Softening Water with Nonmetallic Minerals," and "Alunite Resources of the United States." The Reports of Investigations number into the thousands.

3. *Information Circular Series*—Next to the statistical reports, perhaps of greater interest to the chemical market researcher than any other free publications of the Bureau are the Information Circulars, published by the Economics and Statistics Branch. These are short reports, essentially of an informational character, on economic subjects relating to the mineral industries. They present the general statistical situation and background information on selected commodities and their chief purpose is to present industry with the principal facts on subjects of interest. They are prepared in a concise form suitable for sending out in reply to inquiries, which annually run into the thousands.

Among the 125 "I.C." numbers listed in the "Selected Check-List of Publications" at the end of this article are: Strontium Minerals, Calcium Chloride, Sodium Carbonate, Sodium Sulphate, Chemical Raw Materials and Fertilizers, Marketing Mineral Pigments, Limestone and Dolomite in the Chemical and Processing Industries, and directories of petroleum refineries.

4. *Periodical Reports*—These reports are published at regular intervals as a service to the mineral and allied industries. They contain domestic and foreign statistical and economic data on all of the more important minerals. They are issued weekly, monthly, quarterly, semiannually, annually, and in some cases biennially, depending on the frequency indicated by the need for the information.

Typical of the Periodical Reports are the monthly reports on Aluminum Alloys, Copper Scrap, Iron Ore, Cement, Coke, Mercury, Fluorspar, Petroleum, and Zinc.

The Monthly Coke Reports record the production of beehive and byproduct coke by States, stocks of coke and coking coals, consumption of coal in the manufacture of coke, and production of benzol, ammonia, and ammonium sulfate. In this long series of prosaic figures there is the round-by-round record of the technological fight in which beehive equipment has been virtually eliminated by modern byproduct coke ovens. Correlation of coke output and pig iron activity yields figures of great interest and considerable economic significance. The Monthly Petroleum Statements give data on production, imports, exports, stocks, and demand for crude petroleum and refined petroleum products by States or districts.

Foreign Minerals Surveys, with regional reviews of foreign mineral resources, production, and trade are issued quarterly.

(*Turn to page 478*)

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BOOKLETS & CATALOGS

Chemicals

A895. ALCOHOLS. Complete information about 15 synthetic alcohols produced by Carbide and Carbon Chemicals Corp. is available in a 28-page booklet.

A896. LECITHIN. "Lecithin and Its Use in Industry" is the subject of a recent bulletin of Robinson Wagner Co., Inc.

A897. PLASTICS. Vinylite elastomeric compounds are described in a 20-page book which is available from Bakelite Corp.

A898. QUADRAFOS. "Textile Processing with Quadrafos" titles a small folder (No. 140) which is available from the Rumford Chemical Works.

A899. RESIN. The Bakelite Corp. has issued a 24-page booklet titled "Resin Baking Coatings by Induction Heating."

A900. RESINS. A pamphlet on Synvaren PLS resins, a resorcinol-formaldehyde type, may be obtained from Synvar Corp.

A901. RESINS. The resins which U. S. Industrial Chemicals, Inc. has made available to the trade since April, 1942 are described in the recent issue of the U. S. I. ResiNews.

A902. RESINS. Pentalyn A and Pentalyn H, tackifying resins, are described in a 6-page folder available from Hercules Powder Co.

A903. RESINS. The Textile Resin Department of the American Cyanamid Co. has recently issued Textile Finishing Bulletin 101, "The Production of Durable Coatings on Chintz."

A904. RESINS. Poly-Pale resin is the subject of a recent booklet of the Hercules Powder Co.

A905. RHODIUM is the subject of a 4-page folder available from Technic Inc.

A906. TEXTILES. "The Role of Chemistry in the Development of Textiles" titles a recent booklet of the Burkart-Schier Chemical Co.

A907. THANITE. "The Thanite Family" titles a new 32-page book available from the Hercules Powder Co.

A908. WETTING AGENT. The Alrose Chemical Co. has issued a 12-page technical bulletin on Alrosol, a wetting agent and detergent.

Equipment—Methods

F608. CONVEYORS. Bulletin 127 of Robins Conveyors, Inc. describes and pictures their line of mine conveyors.

F609. CYCLING PLANTS. Operating data on the Grapeland Cycling Plant are contained in a recent 8-page booklet available from Clark Brothers Co., Inc.

F610. WHEELS. The felt wheels of James H. Rhodes & Co. are described in a recent 8-page bulletin.

F611. FLAME-FAILURE SAFEGUARD. The Fireye photoelectric flame-failure safeguard is described in a 4-page bulletin (No. 102-C) which is available from the Combustion Control Corp.

F612. FLOW METER. Data concerning the new indicating flow meter of the Hays Corp. are given in Bulletin #46-766.

F613. FUEL OIL HEATERS. The Whitlock Mfg. Co. has issued a 12-page booklet (No. 35).

F614. GEARS. Abart Gear & Machine Co. has issued a new 4-page bulletin picturing and describing various types of gears.

F615. GLASS CLOTHS. Coated Fiberglas cloths are described in a recent 4-page folder of the Owens-Corning Fiberglas Corp.

F616. HEAT EXCHANGERS. The Griscom-Russell Co. has made a new 8-page bulletin (No. 1230), describing their air-cooled heat exchangers available.

F617. INDUSTRIAL WHEELS are discussed in a folder issued by Thermoid-Grizzly Sales.

F618. INSTRUMENTS. A new postwar general catalog (No. W1800) titled "Specification Index for Bristol Instruments" has just been issued by the Bristol Co.

F619. INSTRUMENTS. The full line of recording and indicating instruments of the Foxboro Co. is described in a recent catalog (No. 370).

F620. INSULATING CEMENT. The Baldwin-Hill Co. has released a new 4-page illustrated folder on their B-H No. 1 insulating cement.

F621. MARKETING. "The No. 1 Challenge to Postwar Enterprise" titles a recent bulletin issued by Lightfoot Affiliates.

F622. MATERIALS HANDLING. To supplement an earlier booklet, "Industrial Logistics," the Elwell-Parker Electric Co. has recently issued four other bulletins. They are titled "The Logistics of Boxes"; "The Logistics of Barrels"; "The Logistics of Bags"; and "The Logistics of Bales."

F623. MATERIALS HANDLING. National Adhesives has published a booklet, "Glued Loads," describing the use of adhesives for palletizing and unitizing shipments of packaged goods.

F624. MOTORS AND GENERATORS. Elinco type "FB" motors and generators are described and pictured in a recent 12-page book of the Electric Indicator Co.

F625. NICKEL ALLOYS. Revised list "A" of the current list of publications on nickel alloys, is available from the International Nickel Co., Inc.

F626. PAPER BAGS. Bemis Brothers Bag Co. have issued an 8-page bulletin titled, "Important Facts for the Man in Charge of Paper Bag Storage."

F627. PERMANENT MAGNET. Prater certified permanent magnets are described and pictured in a 4-page folder available from Prater Pulverizer Co.

F628. POWER FACTOR REGULATOR. The Haug System power factor regulator is discussed in a 4-page folder of the Modern Control Equipment Co.

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A898	A906	F613	F621	F630	F639
A899	A907	F614	F622	F631	F640
A900	A908	F615	F623	F632	F641
A901	F608	F616	F624	F633	F642
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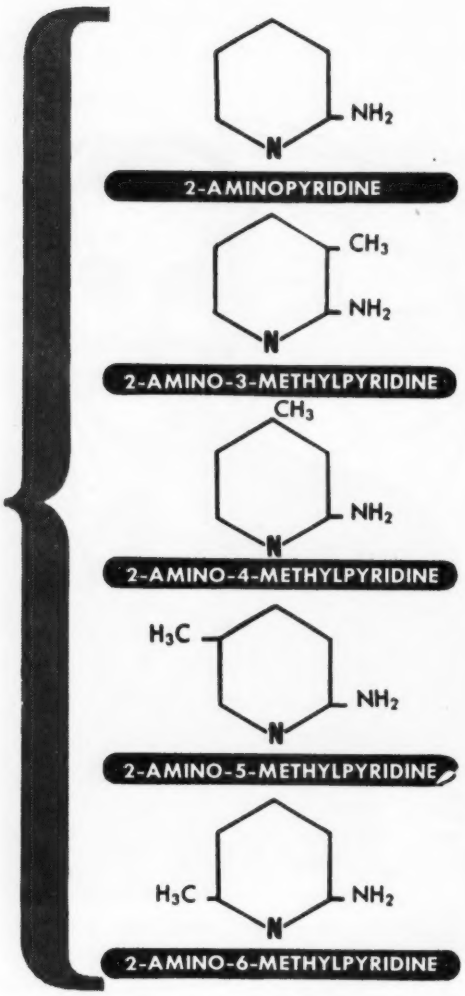

In addition to 2-Aminopyridine, which has been a standard product for several years, Reilly now makes available four methyl aminopyridines. These new products are of special interest in the pharmaceutical field, and also have suggested applications in synthetic insecticides, rubber chemicals, petroleum additives, and in various organic syntheses.

Other Reilly bases: Pyridine, Alpha Picoline, Beta Picoline, Gamma Picoline, 2,6-Lutidine, 2-Hexylpyridines, 2-Vinylpyridine, Quinoline, Quinaldine, Lepidine, Isoquinoline, 3-Methylisoquinoline, 2-n-Amylpyridine, 2-(5-Nonyl) Pyridine, 4-n-Amylpyridine, 4-(5-Nonyl) Pyridine, 2-Ethanolpyridine, 4-Ethanolpyridine, 2-Propanolpyridine, 4-Propanolpyridine.

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F629. Pulverizer. The Prater dual screen pulverizer is the subject of a recent 16-page bulletin of the Prater Pulverizer Co.

F630. Pump. "Facts about Rotary Pumps" titles an 8-page bulletin (No. 307) of the Blackmer Pump Co.

F631. Pump. "Influence of Ground-Water Level on Turbine Well Pump Performance" titles a 4-page bulletin (No. RP 277) distributed by Worthington Pump and Machinery Corp.

F632. Pump. A 20-page catalog (No. 7057), covering the engineering details of its Cameron single-stage general service pumps, has been issued by Ingersoll-Rand.

F633. Rotameter Controllers are described in a new bulletin (No. 50-B) which has been made available by the Fischer and Porter Co.

F634. Rotameters. The Fischer & Porter Co. has recently issued a new 8-page composite bulletin picturing and describing their rotameters.

F635. Rotating Water Joint. A folder describing the Deublin rotating water joint has been issued by Deublin Co.

F636. Safety Siphon. Speare's Safety Siphon is the subject of a recent folder of the Alden Speare's Sons Co.

F637. Testing Laboratory. The Pittsburgh Testing Laboratory has published a new brochure describing and picturing its facilities and organization.

F638. Turbine Oil. Operating characteristics and advantages of Gulfcrest Oil for steam turbine lubrication are the subjects of a new booklet just issued by Gulf Oil Corp.

F639. Valves. Safety and relief valves are the subjects of a catalog (No. 45) that has just been issued by the Farris Engineering Co.

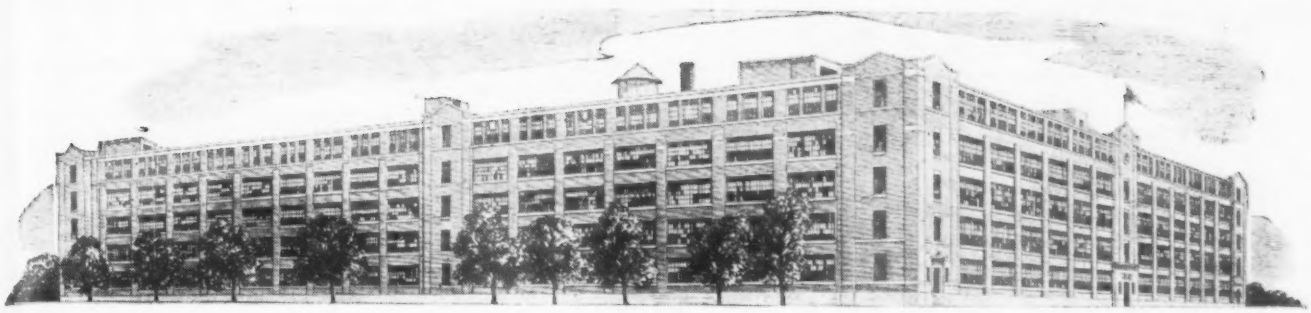
F640. Visual Efficiency. "Industrial Visual Efficiency, a Management Opportunity," titles a brochure, obtainable of the American Optical Co.

F641. Welded Fabrication. "Tailoring in Metal" titles a new 20-page bulletin offered by the United Welding Co.

F642. Welders. Progressive Welder Co. has issued an 8-page bulletin, describing their new Standard Flash Welders.

F643. Wire Cloth. The 1946 edition of the Multi-Metal wire cloth catalog is being distributed by Multi-Metal Wire Cloth Co., Inc.

F644. Wood Treatment. The Arboneeld process for treating wood by dimethylolurea is described in a 14-page booklet which is available from E. I. du Pont de Nemours and Co.



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With alkali metal hydroxides to yield metallic salts.

With carbon bisulfide and metal hydroxides to yield salts of ω-cyanoguanidodithiocarbonic acid.

With cyanogen chloride and basic materials to yield salts of 1,3-dicyanoguanidine.

With aldehydes to form resins.

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Bureau of Mines

(*Continued from page 472*)

Annual Reports include Petroleum Statements, reviewing the salient statistics of production and refining activities and Directories of various branches of the fuel industries—Coke, Coal Gas, Liquefied Petroleum Gases, etc. Many statistical releases are also issued annually as soon as preliminary figures become available on production, consumption, stocks and foreign trade in the principal minerals.

The Nonmetal Economics Division prepares a statement on sulfur every month giving production, mine shipments, apparent sales, and producers' stocks, which is published as a Mineral Market Report. It also prepares a statement on barite production and imports and value of imports which is published quarterly as a Mineral Market Report. A statement on phosphate rock production, stocks, and values is prepared semi-annually and published, likewise, as a Mineral Market Report. It also includes a directory of producers.

The Accident Analysis Division prepares an annual statement "Production of Industrial Explosives in the United States" showing production, by types, and amounts sold for consumption by types, by industries, and by States. It also records ratios of production to capacity, quantities of materials used in manufacturing explosives, and quantities of explosives used per ton of coal. Published in preliminary form as a Mineral Market Report, and in final form as a Technical Paper, it is of great interest to chemical market researchers. This great series, prepared with the cooperation of the Institute of Makers of Explosives has recorded the basic statistics of the explosives industry since 1912.

The Petroleum Economics Division's directory of U. S. Petroleum Refineries, Including Cracking Plants, which is ordinarily published every year as an Information Circular, was discontinued during the war, but is being resumed.

Natural-Gasoline Plants in the United States is another valuable industrial directory prepared by the Petroleum Economics Division, which is usually issued every other year as an Information Circular.

5. *Mineral Market Reports*—For the purpose of supplying information as soon as possible, press releases termed Mineral Market Reports are issued in mimeograph form. Many of them are statistical reviews issued annually as soon as preliminary annual figures for the Minerals Yearbook are available. As has been seen, some Reports come out at more frequent intervals. Some special studies are also published as Mineral Market Reports, such as the extensive studies of coal distribution made in cooperation with the Solid Fuels Administration for War.

Usually the Mineral Market Reports give reviews of the production, consumption, and markets of mineral commodities. Most of this material, in expanded and permanent form, is published later in the Minerals Year Book.

6. *Accident Statistics*—These are brief reports describing some phase of the Bureau's work to improve working conditions and promote safety in the mining industry.

7. *War Mineral Reports*—These reports were issued during the war by the Mining and Metallurgical Branches of the Bureau to give official expression to the conclusions reached on various investigations relating to domestic minerals. These reports were based on the field work of the Bureau and on information made available to it through other sources. They had as their primary purpose the furnishing of information to the war agencies of the United States Government and to assist owners and operators of mining properties in the production of minerals necessary to the prosecution of the war. Examples of these studies are "Flake Graphite Deposits, Clay, Coosa, and Chilton Counties, Alabama", and "Mineral Ridge Fluorspar Property, Livingston County, Kentucky."

These reports were intended for limited distribution. Their postwar status, however, has not been clarified.

LIBRARY

The Bureau of Mines Library in Washington now has over 60,000 volumes and serves as a focal point for information dealing with the mineral industries. Thousands of visits and telephone calls are made every year by persons outside of the Bureau who are interested in all phases of the mineral industries.

In addition to the books, the Bureau of Mines Library also has free educational films produced with funds contributed by private industry. These films are exhibited at educational institutions, industrial plants, and other appropriate places. "Magnesium—Metal from the Sea" produced in cooperation with the Dow Chemical Company, describes by animation and photography the production of magnesium from common sea water and salt brines. "Synthetic Rubber", produced in cooperation with the Goodyear Tire & Rubber Company, shows step-by-step the processes involved in the transition of chemicals to synthetic rubber.

COOPERATIVE STUDIES

The Bureau has cooperated with other agencies in the prosecution of research, and in the publication of information on the mineral industries. Cooperating agencies include City, State and Federal and foreign Government agencies, universities, professional societies, trade associations, chambers of commerce, and private companies. With the Illinois State Geological Survey, for example, a study was made of "The Fluorspar Industry of the United States, with Special Reference to the Illinois-Kentucky District." With the Pennsylvania State College the Bureau cooperated in publishing "The Chemistry of the Petrographic Constituents of Bituminous Coal." The Bureau cooperated with the McGraw-Hill Book Company in the publication of "Mineral Raw Materials," (reviewed by this author in *Chem. & Met. Eng.*, 45, 149, 1938. "This ably prepared survey is . . . impressive for its concise presentation of a large volume of information").

The "Technology, Employment and Output Per-Man" series issued by the Works Progress Administration was also in cooperation with the Bureau insofar as it related to the mineral industries. Titles of possible interest to the chemical market research analyst include "Phosphate Rock," and "Industrial Research and Changing Technology."

The authoritative and comprehensive treatise "Industrial Rocks and Minerals," a 1000-page volume published by the A.I.M.E. in 1937, included a number of chapters by Bureau of Mines experts and a great amount of statistical and technical data from the Bureau's publications and files. Oliver Bowles, one of the Bureau's best known authors, served as vice-chairman of the A.I.M.E. committee which carried out this great cooperative undertaking.

Dr. Bowles is also author of "The Stone Industries," a pioneering book of 500 pages comprehensively discussing what are "next to agriculture the most widespread of all industries in the nation."

OUTSIDE PUBLICATIONS

In addition to the enormous amount of information which is prepared by the staff of the Bureau for publication in official publications described above, staff members also prepare numerous articles of an economic and technologic nature for publication outside the Bureau. These include papers published by the technical press, by technical societies, State universities, and other agencies cooperating with the Bureau of Mines in the conduct of investigations. Many of these papers represent outstanding contributions to an understanding of mineral economics and technology. An examination of the index reveals numerous titles of interest to the chemical market analyst. An index of these contributions is prepared by the Bureau to aid those who are interested in keeping in touch with development in the mineral industries. This index is prepared both on a subject basis and on an author basis.

The volume of such "outside" publications is indicated in the Bureau's "Index of Bureau of Mines Papers Published in the Technical Press, 1910 to 1930," which took up over 500 pages.

Because of shortage of space in this issue, the checklist of Bureau of Mines publications will appear next month.—EDITOR.

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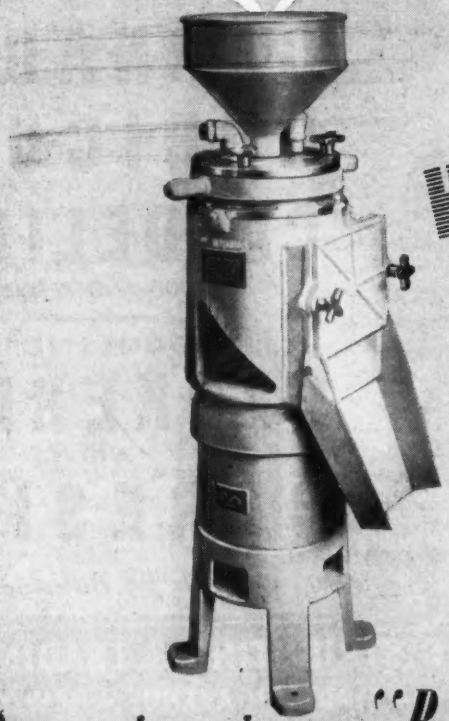

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NEWS OF THE MONTH

Committee Recommends Long Term U. S. Synthetic Rubber Policy

The report of the Interagency Policy Committee on Rubber, prepared for Reconversion Director Snyder, contains the recommendation that a substantial part of the government-owned synthetic rubber producing facilities be kept in permanent operation, preferably under industrial auspices. Reflecting the firm stand of the Army and Navy that at least one third of the functioning plants be kept going in peacetime, it also suggests that no such properties should be declared surplus until natural rubber is much more plentiful.

The government would be charged with the responsibility of rendering possible continued production of synthetics in the face of probable price competition from natural rubber, through tariff adjustments, subsidies, or other incentives. It is acknowledged by the committee that such a program presents short term difficulties, for the immediate objective is to bolster natural rubber stocks, and it is realized that Far East producers can now sell all the rubber they can obtain, virtually at their own prices, in world markets.

The report points out that government-owned units have a "rated capacity" of 833,000 tons of synthetic per annum, with private corporations accounting for an additional 32,500 tons. In 1940 U. S. consumption of rubber — almost entirely natural—totalled 650,000 tons, whereas by the end of last year combined consumption of both natural and synthetic—with the latter representing 88 per cent of the total—amounted to 875,000 tons.

Although some 88,000 tons of natural rubber have been shipped to all consuming countries from the Orient in the past few months, this has been drawn mainly from war-accumulated stockpiles. New rubber production is expected to be small in 1946 and 1947, and substantial improvement in the supply position is not anticipated much before 1948.

The Batt Committee notes that regardless of price considerations synthetic rubber capacity must be maintained, and long term assurance of a market for that part of the industry kept in operation must be established in the face of probable foreign price pressure.

The recommendations of this technical group will be passed along to the White House, and, it is believed, will form the basis of whatever legislation may be required to implement a long range domestic rubber supply plan.

Morgan Joins W. R. Grace

D. P. Morgan, former director of the WPB Chemicals Bureau, has joined W. R. Grace & Co., importers, to direct the company's chemical market research.

Merck Plans Expanded Streptomycin Output

Merck & Co., Rahway, N. J., is spending approximately $4,000,000 for large-scale streptomycin production, and additional facilities for production of penicillin and other medicinal products, it was revealed at a recent meeting of department heads and field sales district managers.

Stockholders of the company, at a special meeting, approved a management financing program under which more than $5,000,000 of new money will be obtained and made available for the expansion.

Hooker Expands Research

Development and research activities of the Hooker Electrochemical Co., reached a new peak last year, E. H. Bartlett, president, stated in releasing the company's annual report. Research expenditures amounted to $383,922 in 1945, compared with $347,568 in the previous year, Mr. Bartlett said, in noting the addition of a physical chemistry laboratory to the research facilities.

The great reduction in technical work for the government has enabled the research department to concentrate on projects for the further diversification of the company's chemical products, and this work will be actively accelerated during the coming year, according to Mr. Bartlett.

Net earnings after taxes for the fiscal year ending Nov. 30, were placed at $1,078,286 compared with $1,264,263 in 1944. Sales of chemical products increased in 1945 over the preceding year by about $1.4 million, while sales costs rose $1.2 million. Net earnings per share of common stock were $2.58, versus $3.18 in 1944.

Rohm & Haas Buys Plant From RFC

The Rohm & Haas Co. has purchased the Knoxville, Tenn., plant which it operated for the government during the war from the RFC for $1,096,200, according to L. W. Covert, vice-president.

The company will resume its Plexiglas operations at this unit by early spring.

Whitescarver Directs New Cyanamid Department

W. F. Whitescarver has been appointed manager of Cyanamid's recently created Protective Coating Products Dept., which will handle the company's products sold to the paint, varnish, lacquer and printing ink industries. He will be headquartered at New York.

Glenn L. Martin Enters Plastics Field

Glenn L. Martin Co. has announced the completion of plans for the construction of a $1.5 million plant for the production of Marvinol, polyvinyl resins.

It is anticipated that the new plant, will begin initial commercial operations by

next fall and ultimately will have an annual capacity of some 11,000,000 pounds of the resin.

Output will be restricted to the base vinyl polymers, which will be sold as such to fabricators and convertors.

Joins Comml. Solvents' Insecticide Division

James G. Sanders has been engaged by Commercial Solvents to develop markets for insecticides, fumigants, and allied products. As an entomologist, he was retained by the government during the war, working in South America and Iran, prior to which he had been associated with Sun Oil Co.

Commercial Production of Rutin Contemplated

Large scale production of a rutin, a drug extracted from buckwheat, may be realized within the year, based on the discovery by the University of Pennsylvania that the compound holds much promise for the prevention of apoplexy and other hemorrhages resulting from high blood pressure. Medical needs for the drug during 1946 will total 10,000 pounds, according to Percy A. Wells, director of the Eastern Research Laboratory, and eventual annual U. S. consumption is placed at 1,300,000 pounds.

Rutin is not a new drug, for its discovery dates back a hundred years, but its possible medical application was not determined until recently. Four major drug companies cooperated with the Eastern Research Laboratory last summer in producing limited quantities of the material for clinical testing at the University of Pennsylvania, and large-scale output is now being considered.

Mathieson to Double Sodium Chlorite Capacity

The Mathieson Alkali Works plans to double the capacity of its sodium chlorite plant as soon as construction materials are available, according to its recently issued annual report. Half of its construction expenditures last year were devoted to expanding facilities for producing dry ice and HTH hypochlorites, to bring total investment in plant properties to $39,681,534.

Net earnings of the company for the year were $1,148,631 or $1.19 per share, against $1.40 per share on the same number of shares in the preceeding year. Sales last year at $19,590,256 were up $1,210,330 over 1944, but increased wages and material costs pared profits, according to E. M. Allen, chairman.

CALENDAR *of* EVENTS

AMERICAN CERAMIC SOCIETY will hold its 48th annual meeting at the Hotel Statler, Buffalo, April 28—May 1.

AMERICAN CHEMICAL SOCIETY, national meeting, Claridge Hotel, Atlantic City, April 8-12.

A. I. CH. E., Regional meeting, Rice Hotel, Houston, Texas, Mar. 31—Apr. 3.

AMERICAN GAS ASSOCIATION conference on industrial and commercial gas, is scheduled for the Commodore Perry Hotel, Toledo, Ohio, Mar. 29-30.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS will celebrate its 75th anniversary at the Waldorf-Astoria, New York, September 16-18, 1946.

AMERICAN OIL CHEMISTS SOCIETY, 37th annual meeting, Roosevelt Hotel, New Orleans, May 15-17.

AMERICAN SOCIETY FOR TESTING MATERIALS will hold the 49th annual meeting in Buffalo, N. Y., June 24 to 28, 1946.

ELECTROCHEMICAL SOCIETY will hold a national convention in Birmingham, Ala., April 11, 12 and 13, 1946.

NATIONAL CHEMICAL EXPOSITION will be held at the Chicago Coliseum, Sept. 10-14.

NATIONAL INSTRUMENTATION CONFERENCE and Exhibit, Hotel Wm. Penn, Pittsburgh, Sept. 16th-20th.

NATIONAL PLASTICS EXPOSITION, Grand Central Palace, New York, April 22-27.

PACKAGING EXPOSITION of 1946 will be held in the Public Auditorium, Atlantic City, N. J., April 2 to 5, inclusive, 1946, sponsored by the American Management Association.

PRODUCTS OF TOMORROW EXPOSITION will be held at the Coliseum in Chicago, April 27—May 19, 1946.

Naugatuck Announces Expansion Plans

To transform the knowledge of chemicals gained during wartime into products for industrial and civilian use, more than $2,000,000 will be spent to expand the facilities of the Naugatuck Chemical division, United States Rubber Company, at Naugatuck, Conn., it is announced by Herbert E. Smith, president of the company.

"This new plant expansion," Mr. Smith reports, "is part of a three-way program to meet the increased demands for rubber chemicals, latex, dispersions and agricultural chemicals; for the production of new plastics, and to further general scientific research."

The expansion program includes the construction of eight new buildings, all of which are expected to be in operation before the end of 1946.

Du Pont Increases Scholarship Awards

The Du Pont Company has announced plans to award more than twice as many university fellowships this year as in 1945.

The chemical industry today is facing a serious shortage of chemists, physicists, and engineers with advanced training. To help meet this problem the Du Pont plan provides for forty-one post-graduate fellowships in chemistry, five in physics, fifteen in chemical engineering and seven in mechanical engineering. Six post-doctoral fellowships in chemistry also are included in the enlarged fellowship program.

Data on German Detergents Available

German development of a valuable class of nonacid and nonalkaline detergents for synthetic fibers has been revealed through Allied investigation of the Oxo plant at Ruhrchemie, Oberhausen-Holten, Germany.

Production of detergents for synthetic fibers at the Oxo plant is reported to have involved reaction of olefines with water gas in the liquid phase resulting in a mixture of straight aliphatic aldehydes and ketones. The aldehydes were then reduced to alcohols, said by the investigators to be suitable as detergents for synthetic fibers.

Detailed discussion of the production processes involved, together with a presentation of 30 formulas used by the I. G. Farbenindustrie plant at Ludwigshafen in producing dyestuffs for acetate rayon, and data on German production of various other chemicals, are contained in Report No. 4115, distributed by OPB at 25c per copy.

Russell Named to Manage PQ Sales

John C. Russell has been promoted by Philadelphia Quartz Co. to the post of sales manager. Mr. Russell, associated with PQ since 1924, is a director of the affiliated American Doucil Co., manufacturer of synthetic zeolites.

Amecco Chemicals Moves Production Headquarters

Amecco Chemicals, Inc., manufacturers of synthetic organic chemicals, has sold its Rochester plant and is transferring manufacturing operations to Dover,

Ohio, and Henderson, Nevada.

Enlarged production facilities are planned for the new locations, involving greater output of chlorinated paraffins, pharmaceutical and dye intermediates.

Amecco will share the plant of its affiliate, W. C. Hardesty Co., Inc., at Dover, as well as developing the recently acquired Henderson, Nevada, property.

Winthrop Advances Dennis

Emery W. Dennis, named head of chemo-therapy research by Winthrop Chemical Co. Inc., with headquarters in Rensselaer, N. Y. During the war Dr. Dennis served as malaria control consultant to the Allied governments.

Goodrich Forms English Company

To extend their plastic manufacturing business, the B. F. Goodrich Co., Cleveland, and Distillers Co. have organized British Geon Ltd., a private company.

The new firm is incorporated in England with capital of £500,000.

Activated Carbon Plants Available From WAC

Four government-owned plants for the production of activated carbon, and the equipment of a fifth unit, are available for sale or lease, according to the War Assets Corp. Some 1000 tons of the charcoal, valued at about $1 million, was also declared surplus and purchasable.

The plants, located at Fostoria, Ohio (two); Columbia, Tenn.; Seattle, Wash.; and the equipment at Zanesville, Ohio, are valued at $4,972,000, and had a rated capacity of 875 tons of activated charcoal per month. The equipment at the two Fostoria plants, and at Columbia, has been dismantled. The Seattle unit, held by the CWS, is not for sale but may be leased. Production costs of the carbon produced in government plants during the war averaged $770 per ton, although larger scale operations, would undoubtedly result in appreciable economies.

The activated carbon developed by CWS is made from bituminous coal and

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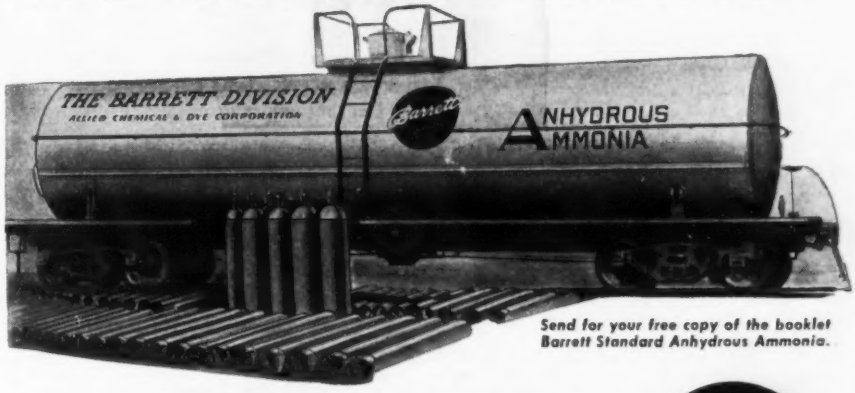

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Newport Plans New Naval Stores Unit

The new plant to be built by Newport Industries at Oakdale, La., at a cost of $4 to $4.5 million, will increase the company's naval store productive capacity by 50 per cent, according to officials.

Now the second largest producer in the wood naval stores industry, Newport has about 28 per cent of the capacity of the industry. Upon completion of the new unit Newport will have about 30 per cent of the total, allowing for plant extensions being constructed by its competitors.

Basic products, rosin, turpentine, and pine oil accounted for some 57 per cent of the company's business last year, compared with 73 per cent in 1937-1940. During the same period synthetic chemicals derived from rosin increased from 7 to 16 per cent of total sales.

Mathieson Names Logan Assistant Sales Manager

John O. Logan has been appointed assistant general manager of sales of The Mathieson Alkali Works, according to an announcement by President G. W. Dolan. Mr. Logan has been with Mathieson since 1931 and has served in the company's New York and Chicago Office.

WAC Surplus Chemicals Stocks and Sales

Government holdings of surplus chemicals at the end of 1945 rose to $50,871,000, according to a year-end report of the War Assets Corporation on acquisitions and sales of surplus products. As of the close of the year the report showed that surplus chemicals which cost the government $8,113,000 had been sold for $4,897,000.

Sales and holdings of surplus chemicals as of December 31, 1945, by major classifications were:—

Heavy chemicals, $406,000 sold for $203,000 with $1,073,000 remaining on hand; industrial, industrial fine, and related chemicals, $1,324,00 sold for $589,000 with $4,852,000 remaining; coal and petroleum crudes, $210,000 sold for $94,000 with $2,737,000 remaining; intermediates, cyclic, $140,000 sold for $120,000 with $3,002,000 remaining; dyes, $97,000 sold for $68,000 with $3,315,000 remaining; miscellaneous organic chemicals, $2,756,000 sold for $1,784,000 with $7,656,000 remaining; chemical warfare agents, except phosgene, $1,226,000 sold for $1,024,000 with $2,012,000 remaining; paints, varnishes, lacquers, japans, thinners, $869,000 sold for $465,000 with $7,112,000 remaining; high explosives, $38,000 sold for $23,000 with $3,074,000 remaining; miscellaneous chemicals, including industrial chemical products and preparations, $488,000 sold for $171,000 with $10,781,000 remaining; other chemicals, $476,000 sold for $293,000 with $4,063,000 remaining; condensation plastics, $83,000 sold for $59,000 with $1,194,000 remaining.

Commercial Solvents Pilot Plants Streptomycin

As an outgrowth of laboratory work conducted over the past few months, Commercial Solvents Corp. has begun pilot plant production of streptomycin at its Terre Haute facilities.

Priorities have already been granted to the company for the construction of a full scale unit.

Standard Oil Builds New Research Laboratories

Standard Oil Co. (Indiana) has begun construction of its new petroleum research laboratories at Hammond, Indiana, adjacent to its Whiting, Indiana, refinery.

The first units scheduled for completion are the administration and chemical engineering building, the main research laboratories, and the pilot plant facilities equipped for work on chemicals, catalysts and greases. There will be a separate building for research on distillation, with engineering laboratories, and a greenhouse for plant spray investigations to be built later.

The laboratories will cover about two city blocks and upon completion early in 1947 will house 420 chemists, chemical engineers, and other scientists, along with 800 technicians and assistants.

Du Pont Extends Search For Ilmenite Ore

The North Carolina State Board of Conservation and Development has approved a broadened contract with du Pont to permit the company to prospect for ilmenite-containing sand on the bottom of virtually every body of water in the eastern part of the state.

Under a lease first signed in 1942, and renewed a year ago, du Pont has been permitted to prospect in Albermarle Sound, but the new contract extends these rights to cover the sounds and rivers of the coastal area as far south as Cape Fear River.

Du Pont has agreed to pay the state a royalty on all ilmenite taken from these water bottoms, and on all sand and gravel removed in the course of mining operations.

Ernst Berl, Carnegie Tech. Emeritus Professor, Dies

Ernst Berl, renowned explosives expert, died at Pittsburgh on Feb. 16, at the age of 68. Dr. Berl, as a refugee from Nazi Germany, came to the U. S. in 1933 to become professor of research engineering at Carnegie Tech. In the past few years he rendered valuable service to the CWS and Navy Ordnance.

Govt. Releases Monomeric Styrene

As a means of averting an impending shortage of monomeric styrene in this country, the Office of Rubber Reserve, Reconstruction Finance Corporation, has announced that it will make available to private industry, effective immediately, such quantities of monomeric styrene as may be produced in excess of the requirements of the Government's synthetic rubber program.

Sales will be made only in tank car lots at the established market price of 13 cents per pound, f.o.b. the Government producing plant nearest the point of delivery. The arrangement whereby Government-produced monomeric styrene will be sold to consumers outside of the synthetic rubber industry is a temporary one, and will end as soon as private industry can supply consumer demands, the Office of Rubber Reserve stated.

Sinclair Plans New Research Center

Sinclair Oil Corp. has completed plans for the reconstruction of a petroleum research laboratory at Harvey, Ill., to provide enlarged quarters for the company's

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The new laboratories will double Sinclair's research facilities, and will house some 550 technologists.

M. I. T. to Study Plastics Engineering Properties

Long-range research which will improve service to industry by providing guidance for wiser applications of plastics in consumer products has been started at the Massachusetts Institute of Technology, it has been announced by the Plastic Materials Manufacturers Association, Inc., made up of the leading producers of plastics.

The work at M.I.T. will be under the supervision of A. G. H. Dietz, of the Department of Building Engineering and Construction, who will act as director of the project. Research will deal with the fundamental engineering properties of plastics and, if necessary, will set up new test methods, similar to those now available for other structural materials.

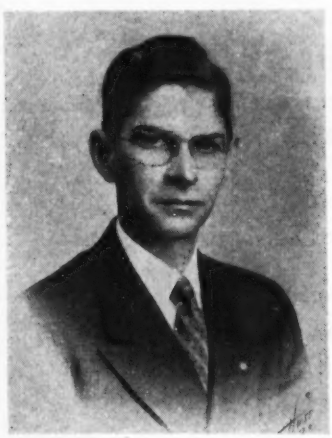
COMPANIES

Witco Purchases Stearate Producing Facilities

The Witco Chemical Co. has recently acquired the Franks Chemical Products Co., Brooklyn and has doubled plant capacity for the production of aluminum, barium, calcium, lead, magnesium, zinc, and sodium stearates.

No change will be made in the present management and Joseph N. Franks will continue as president of the new concern, which will be known as the Franks Chemical Products Co. Division of Witco Chemical Co.

Dodson Heads Wyandotte Calcium Chloride Sales



L. D. Dodson has been placed in charge of Wyandotte Chemical's calcium chloride sales, to succeed Jerome H. Remick, Jr. Mr. Dodson is also manager of the company's Dept. of Public Business.

Penn Salt Net Earnings Shaded

Subject to renegotiation, and after deduction of Federal taxes, Pennsylvania Salt Manufacturing Company reports net profits for the 12 months ended Dec. 31, 1945 of $1,288,329.59 or $1.72 per share on 750,000 shares of $10. par stock outstanding, which compares with the earnings for the 12 months ended Dec. 31, 1944 of $1,413,956.26 or $1.89 per share.

Celanese and Tubize Rayon Merge

Celanese Corp. of America, manufacturer of about one-half of total U. S. production of cellulose acetate yarns, has entered the viscose rayon field by the absorption of Tubize Rayon Corp.

The total assets of the merger now approximate $150 million and Tubize will be operated as a division of Celanese.

Davison Profits Down

Net income of the Davison Chemical Corp. for the six months ending Dec. 31, the first half of the company's fiscal year, amounted to $342,000, after taxes. These earnings equal 67 cents a share on outstanding shares of capital stock, compared with $468,816 or 91 cents for the corresponding period of 1944.

Net sales for the six months totalled $10,767,388, down from $12,296,085 for the 1944 period but above the comparable 1943 figure of $10,265,447.

The company has almost completed its termination of war contracts and other wartime adjustments, but it is not expected that these settlements will affect earnings or working capital position.

UCC Earnings Steady

Earnings of Union Carbide & Carbon Corp. last year are estimated at within a few cents a share of the $4.06 reported in 1944, although sales are believed to be slightly lower than 1944's $508 million. Business in ferro alloys and cutting gases has been adversely affected by strikes in the steel and automotive industries, but sales of chemicals and plastics are placed above 1944.

The company is budgeting about $50 million for the construction of new facilities during the next two years, chiefly for chemicals, alloys, and plastics.

Dow Reports Earnings

The unaudited consolidated net income of The Dow Chemical Company and subsidiaries for the six months ended November 30, 1945 was $3,721,908.95 after providing $2,672,694.32 for Federal income tax computed on such earnings. After deducting the provision for dividends on the preferred stock this was equivalent to $2.49 per share on the common stock outstanding.

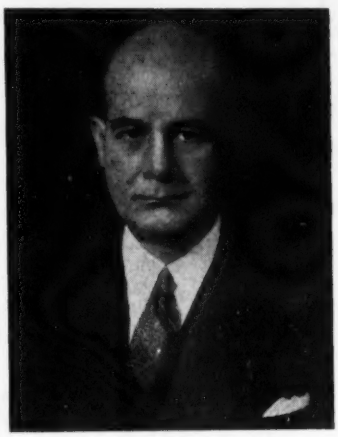
In computing the net income for the period there was deducted $2,837,794.91 for the amortization of facilities covered by Certificates of Necessity, representing the regular provision for amortization to September 30, 1945 on a 60-month basis as originally provided under the Internal Revenue Code and on the basis of the deduction made in prior periods.

Socony Extends Petroleum Research Laboratories

Socony-Vacuum Oil Co., Inc., plans a million dollar expansion of its Paulsboro, N. J., research and development laboratories to further its investigations in the field of petroleum chemistry.

Foremost among the construction scheduled are a chemistry building, physics laboratory, and a pilot plant for lubricating oils. Upon completion of the project Socony expects to extend its research staff to include a total of some 800 scientists.

Preston Promoted by American Maize Co.



Lawrence G. Preston, vice-president in charge of sales for The American Maize Products Co. for the past 15 years, has been elected executive vice-president of the company, according to a recent announcement made by the board of directors.

Crosby Chemicals Completing New Facilities

Crosby Chemicals Inc., formerly Crosby Naval Stores Inc., Picayune, Mo., is completing construction of its DeRidder, La., plant which will increase its total productive capacity to 100,000 tons per annum of pine-based chemicals.

The DeRidder unit will also house the company's main offices and research and control laboratories.

Summers Broadens Fertilizer Holdings

Summers Fertilizer Co., Baltimore, has recently acquired the outstanding stock of Griffith and Boyd, according to J. E. Totman, president of the Summers organization, and plans are being developed to expand and modernize the Griffith 50,000

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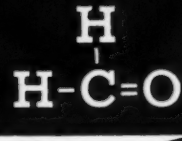

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ton per annum unit, so that it will be able to manufacture the mixed fertilizer requirements of both companies.

For the present, Griffith and Boyd will continue as a separate division, under the existing management, with the addition of Summers directors, J. E. Totman, J. H. Skeen, and W. A. Fessler to its Board.

Sun Chemical Acquires Warwick Chemical Co.

The Sun Chemical Co., New York, the recently adopted name of the former General Printing Ink Corp., has purchased the Warwick Chemical Co., manufacturer of specialized waxes and metallic stearates.

The Warwick Co., with plants at West Warwick, R. I., Wood River Junction, R. I., and Rock Hill, S. C., will become an integral part of the fine chemicals division of the parent concern, under the supervision of William F. Talbot, head of Sun's fine chemical activities.

Davison Implements General Wage Increase

The Davison Chemical Corporation, Baltimore, has announced an increase of 15 per cent in wages and salaries to employees of the company, and its subsidiaries in all locations, effective as of Feb. 1st.

Davison, currently owns plants in Baltimore; Bridgeport, Conn.; Columbus and Alliance, Ohio; Savannah, Ga.; Gretna, La.; Nashville, Tenn., and New Albany, Indiana.

Heads Ciba Research

Frederick F. Yonkman has been appointed director of research of Ciba Pharmaceutical Products, Inc., and will be headquartered in New York.

I. C. I. Plans Major Expansion

Imperial Chemical Industries, Ltd., has acquired a 3,500-acre site in the center of the Yorkshire coal mining districts and plans to invest some ten million pounds, over the next five years, in the construction of chemical producing facilities. Large scale output of coal-based chemicals, sulfuric acid, and chlorine is planned.

It is anticipated that some 10,000 people will be employed, and I. C. I. emphasizes that the proposed development is an indication of the appreciation in Britain that coal is no longer a commodity to be exported, but rather a domestically exploitable raw material.

National Magnesium Forms Insecticide Division

National Magnesium Corp., Elkton, Md., has recently formed an insecticide division and will specialize in the production of DDT solutions and powders.

Utilizing grinding techniques developed in the preparation of magnesium powders during the war, the company is specializing in the preparation of micronized DDT powders particularly suitable for aerial and ordinary dusting.

Mathieson Extends Southern Carbon Dioxide Warehousing

The Mathieson Alkali Works has recently completed construction of two new warehouses for dry ice and carbonic gas, one in Greensboro, N. C. and the other in Washington, D. C., and plans to replace buildings now being used in Miami, Norfolk, and Charlotte, with its own warehouses in the near future.

These distributing points are supplied by Mathieson's Saltville, Va., carbon dioxide facilities.

ASSOCIATIONS

Chlorine Institute Names New Officers

At its annual meetings held in New York recently the Chlorine Institute named the following directors for two year terms: George M. Dunning, Wyandotte Chemicals Corp.; F. W. Fraley, Diamond Alkali Co.; R. W. Hooker, Hooker Electrochemical Co.; S. W. Jacobs, Niagara Alkali Co.; E. C. Speiden, Isco Chemical Division, Innis, Speiden & Co.

S. W. Jacobs, E. C. Speiden, and R. T. Baldwin were appointed president, vice-president, and secretary-treasurer, respectively.

Howard Heads California A. C. S.

Louis B. Howard of Washington, D. C., assistant chief of the United States Bureau of Agricultural and Industrial Chemistry, has been elected chairman of the California Section of the American Chemical Society for 1946.

Dr. Howard, who succeeds William E. Vaughn of the Shell Development Company, Emeryville, Calif., was chosen by the California chemists as a result of his service in the Western Regional Research Laboratory at Albany, Calif., from

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1940 until he was called to Washington recently as assistant to Dr. O. E. May, chief of the Bureau of Agricultural and Industrial Chemistry.

Compressed Gas Assoc. Names Officers

At the 33rd annual meeting of the Compressed Gas Manufacturers' Association, held at the Waldorf-Astoria early last month, Clarence McL. Pitts, president of the Peoples Gas Supply Co. Ltd., Ottawa, Can., was named association president for 1946.

Charles G. Andrew, Air Reduction Co., and L. W. Hench, American Carbonic Co. were elected vice-presidents and F. R. Fetherston was re-appointed secretary-treasurer.

New A. C. S. Section

A new local section of the American Chemical Society has been chartered in Monmouth County, N. J., it is announced by Alden H. Emery, national secretary of the Society. The new unit, which will be known as the Monmouth County Section, has its headquarters at Red Bank.

Meredith F. Parker, Long Branch, of E. I. du Pont de Nemours & Co., is chairman of the Section and Ernst T. Franck, of the Science Department of Manasquan High School, is vice-chairman.

Elect New Officers Maryland A. C. S.

Giles B. Cooke, research executive of the Crown Cork & Seal Company, Baltimore, has been elected chairman of the Maryland Section of the American Chemical Society for 1946.

Other new officers are: John Herculson, head of the Department of Chemistry at Morgan State College, vice-chairman, and Channing W. Wilson, research chemist for the Consolidated Gas, Electric Light and Power Company, secretary-treasurer.

PERSONNEL

Adams Awarded Davy Medal

The Davy Medal of the Royal Society of London, one of the world's greatest scientific honors, has been awarded to Prof. Roger Adams, head of the Department of Chemistry in the University of Illinois and chairman of the board of directors of the American Chemical Society, who is now in Berlin as special adviser to Lieut. Gen. Lucius D. Clay, deputy military governor of the American occupation zone in Germany.

Professor Adams, who served in Washington with the National Defense Research Committee during the war, was cited "in recognition of his extensive researches in the field of organic chemistry and of his recent work in the alkaloid field."

National Aluminate Advances Jacoby

The National Aluminate Corporation, Chicago, Ill., has named Arthur L. Jacoby assistant director of Research. Dr. Jacoby has been with the National Aluminate Corporation since 1938 as chief organic chemist, coming to that organization from Iowa State College.

Milano Returns to Millmaster Chemical Company

Robert J. Milano has returned to his post as head of Millmaster Chemical Co. after serving in the Army since June 1942. Expansion of the company's line of fine chemicals, with the completion of additional production facilities, is planned immediately, according to Capt. Milano.

Fischer to Receive A. I. C. Award

Martin Henry Fischer, research worker and member of the faculty of the College of Medicine of the University of Cincinnati, will receive the 1946 Award of Merit of the Miami Valley Chapter of the American Institute of Chemists commemorating Dr. Fischer's nearly 50 years of outstanding service to the science of chemistry in the United States.

The award will be presented at a meeting and banquet to be held in Cincinnati the latter part of March.

Hercules Promotes Oswald

Frank G. Oswald has been appointed assistant sales director of the Synthetics Department of Hercules Powder Company, according to an announcement made by W. M. Billing, general manager of the department. He will assist in general sales policies, sales training, and in coordination of technical sales activities.

The department is establishing a new group to handle the market development of new products, with Malcolm C. Moore as manager, and J. Glenn Little as assist-

ant manager. Others assigned to the group are Paul Johnstone and James Monkman.

Baragwanath Heads Freeport Explorations

J. G. Baragwanath has been named director of exploration of Freeport Sulphur Company, it has been announced by Langbourne M. Williams, Jr., president.

Mr. Baragwanath, a mining engineer who has played a prominent role in mining developments in Peru, Ecuador, Canada and the United States, has recently been general manager in Cuba of Nicaro Nickel Company, a subsidiary of Freeport Sulphur Company.

Du Pont Staff Changes

The retirement of J. L. E. Cheetham as production manager of the Du Pont Company's Ammonia Department and the appointment of C. H. Doherty, Jr., as his successor, has been announced.

With the company for 31 years, Mr. Cheetham has been production manager since 1937. Before that time, he was manager of the Belle, W. Va., Works.

Mr. Doherty has been with the Du Pont Company since 1918, and for about eight years was in Chile with the Du Pont Nitrate Company. For the past year he has been assistant production manager at Wilmington.

Avery Leaves Diamond

Julian M. Avery has resigned as vice-president in charge of research and development of the Diamond Alkali Company to establish a private consulting practice with headquarters temporarily at his home address, Chillicothe Road, Mentor, Ohio.

Among other activities Mr. Avery will cooperate with Arthur D. Little, Inc., consulting engineers of Cambridge, Mass., in the further development of inventions assigned to them during his previous employment by that organization.

Goodrich Staff Changes

Harlan L. Trumbull, director of synthetic rubber and textile research of The B. F. Goodrich Company, will serve as manager of the research and development division, synthetic rubber department, Rubber Reserve Corporation in Washington, D. C., on a temporary basis, it is announced by Howard E. Fritz, B. F. Goodrich director of research. In Dr. Trumbull's absence, E. A. Willson will be acting director of synthetic rubber research and R. A. Crawford acting director of textile research.

Schwarz Establishes Consulting Office

J. Casper Schwarz, formerly assistant superintendent of Lambert Pharmacal Co., has opened an office at 4 Wakefield, Ladue, Mo., as consultant to the cosmetic, perfume and allied industries.

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Rubber Chemicals

(*Continued from page 428*)

Along the line of protecting rubber or synthetic rubber compounds, there is a definite need for better high-temperature stabilizers. We refer to them as stabilizers rather than antioxidants because we feel that oxidation is only partly involved. We often find ourselves confronted with high temperature applications which, at the present state of the rubber compounding art, are simply beyond the temperature range of present materials. Certain antioxidants possess some value in this regard but not enough to make any outstanding differences. Certain types of acceleration contribute more in this regard than do the antioxidants. It may be that the desired improvement will come by way of better types of acceleration, although this field, as stated before, has been very carefully explored. There is always the possibility that an improved high temperature polymer may be developed. Silicone rubber is outstanding in high temperature resistance, but its deficiencies in certain other rubber-like properties eliminate it as the answer to many problems.

It would be extremely difficult to appraise the market for such a material since the applications involved are ones where rubber is probably not now being used.

ADHESIVES

This last item is a very real need and one which might not be too widely recognized. It has been found that certain of the cement types of adhesives used for rubber to steel—particularly those containing chlorine derivatives of rubber—give trouble with deteriorating adhesion resulting from rusting and corrosion when the parts are exposed to water or salt water under certain conditions. This will not be apparent in every application because of design factors. Rubber is not completely impervious to water, and where thin sections adhered to metal are exposed and the section is under high stress, the deterioration of adhesion has taken place. The obvious procedure is to design around the difficulty by using thicker sections, but this is not always possible and the problem is still there.

CONCLUSION

In conclusion and to summarize, there have been suggested two fields which would extend the useful temperature range of rubber products:

1. A more potent low temperature plasticizer or an improved low temperature polymer;
2. A high temperature stabilizer.

These two materials, if found, would improve present service and would broaden the applications of rubber compounds.

It has been pointed out that there is a need for more non-toxic, effective, and economical solvents for the oil-resisting synthetic rubber which, if sufficiently economical, have the added potentiality of being applied to the larger field of the non-oil resisting rubbers. There is also a need for reclaiming oils with greater swelling power which will overcome present difficulties of "gassing" and odor. With the changing picture in regard to available types of scrap, these problems will become more evident. In the field of chemical plasticizing agents, pigments, accelerators, and antioxidants, our needs seem to be fairly well supplied. However, more powerful flex-resisters, more powerful non-discoloring antioxidants and better sun-checking resisters for certain types of rubber would be desirable.

As stated at the outset, this discussion has been limited to the writer's personal knowledge of the status of development in these fields and, on that basis, the problems and desired improvements have been suggested. In most of these fields, there is already an extensive background of development effort and, for this reason, progress will probably be slow. It goes without saying that the rubber industry will promptly welcome and utilize any valid, measurable, and reproducible improvement or economy.

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CHEMICAL SPECIALTIES NEWS

Weed Killer Noted as Non-Toxic to Animals

Use of 2,4-D in spraying pastures to kill weeds has not proved injurious to cows or sheep grazing on the treated vegetation, according to results of tests by the U. S. Department of Agriculture's Research Administration. The experimenters found no indication that any of this herbicide, known chemically as 2,4-dichlorophenoxyacetic acid, passed from the digested herbage through into the cow's milk. Even when they added the pure chemical to the grain ration of a cow at the rate of 5.5 grams a day for more than 100 days no ill effects in weight, production of milk or even in appetite, were noted.

Because of its bearing on their own work and the general interest in the possible effects of a chemical used directly or indirectly in the production of farm crops, the experimenters call attention to a recent report by E. J Kraus of the University of Chicago, that a man had taken a daily dose of half a gram of purified 2,4-D every day for three weeks with no ill effect.

Ledeen Joins Drierite

J. L. Ledeen, formerly with G. E.'s air conditioning division, has joined W. A. Hammond Drierite Co. as manager of engineering sales. He will be engaged in the development of further applications for the company's desiccant.

DDT Wallpaper Developed For Spring Marketing

A new type of ready-pasted wallpaper, impregnated with DDT, is being produced by the Trimz Co., Inc., Chicago, and will be distributed nationally by April.

The wallpaper, which is specially designed for lining clothes closets, contains 5 per cent active DDT in the top coating, which has been dyed and incorporated into the product so that it will not show or rub off.

It is claimed to be non-hazardous to human beings and domestic animals and is guaranteed effective for a year for the control of moths, ants, flies, mosquitoes and silverfish.

Botanist Discovers New Carnauba Competitor

Preliminary laboratory investigations reveal that the Cauassu plant, which grows profusely along the upper Amazon, may be exploitable at a source of high melting point wax competitive to carnauba, according to Nelson Knaggs, Hilton-Davis Chemical Co.

Mr. Knaggs, who recently conducted a wax exploratory expedition to South America, states that the point of major significance is that the Cauassu plant lends itself to plantation cultivation, in that wax yields are realized within a year, whereas the carnauba palms require ten years to mature.

Cauassu wax has a melting point in the carnauba range, high gloss characteristics, and is potentially available in tremendous quantities. However, it does not loom as an immediate carnauba competitor because commercial development would require several years of organizational endeavour.

In addition to the Cauassu plant, Mr. Knaggs obtained seedlings of two other wax-producing shrubs to be grown and studied in the company's Cincinnati greenhouses.

Synthetic Pearl Essence Output Increased by Celanese

Celanese Chemical Corp. is increasing production of H-Scale, a synthetic pearl essence, in order to meet the greatly enlarged demands for mother-of-pearl in the jewelry and other consuming industries.

Celanese H-Scale is a diffusion of minute white mother-of-pearl type crystals suspended in a medium suitable for its application to various plastics.

Disclose Experiments With Sulfaiodines

A new series of compounds known as sufaiodines, which combine the most useful features of sulfonamides and iodine for the treatment of wounds, has been reported by Dr. Paul Goedrich, Rutgers University College of Pharmacy, Newark.

According to Dr. Goedrich, chemical combination of sulfonamides with a small proportion of iodine gives these compounds the advantage of non-selectivity in their attack on bacteria. Unlike the better known sulfa drugs and penicillin, no pathogenic organism has been encountered which resists their antibacterial action, in vitro.

Clinical testing of the new compounds is now in progress at a number of hospitals and clinics.

Calgon Appoints Daugherty Asst. Research Director

T. H. Daugherty, recently released by CWS, has rejoined Hall Laboratories and Calgon Inc. as assistant director of research. Lt. Col. Daugherty served with the Army in India, Burma, and China.

Jaygol Distribution Plans Completed

Nationwide distribution through drug stores is scheduled for Jaygol insect "abolishers," according to an announcement by Jay D. Miller, president of Jaygol Products Corp., Brooklyn.

The insecticide, which is claimed will eradicate and provide lasting protection against household pests, is available in both powder and liquid form.

The powder is stated to contain 68 per cent boric acid and 32 per cent inert ingredients, which are said to induce insects to eat boric acid, which they normally do not like. The liquid compound, developed to combat bedbugs and black house ants, is stated to kill existing insects, destroy their eggs and larvae, and guard treated articles against re-infestation.

Chemical Coating Corp. Formed by E. H. Christ

Formation of a $200,000 corporation to manufacture and market industrial coatings, lacquers and technical finishes, has been announced by Edward H. Christ, former vice-president of the Stanley Chemical Co.

The new organization will be known as Chemical Coating Corp., with plant and offices in New Britain, Conn. and will be

headed by Mr. Christ as president, and S. K. Hopkins and Edward D. Sechrest as vice-presidents.

Three Part Grass Spray Possible

Combining a weed killer, a fertilizer and a fungicide in solution for single application to grass and possible other crops begins to look like a feasible short cut, say scientists of the U. S. Department of Agriculture's Research Administration. Working at the Plant Industry Station, Beltsville, Md., P. C. Marth and J. W. Mitchell tried out as a grass spray mixtures of the herbicide, 2,4-D, the nitrogen fertilizer urea, and the fungicide Fermate. They learned, for one thing, that the weed killer is no worse for the grass when used along with the fertilizer, or with the fertilizer and fungicide, than when used alone.

Application of 2,4-D solution, with enough urea to provide 60 pounds to the acre, made the grass a strong green color within a few days and the weed-killing power of the 2,4-D was as good as when used alone. So far only a part of the fungicide factors have been uncovered, but it has been shown that the presence of Fermate doesn't interfere with the weed-killing, nor with the fertilizing.

Lederle Produces New Hyperthyroid Drug

Lederle Laboratories Inc., a subsidiary of American Cyanamid Co., has begun the production and marketing of Deracil, designed to prevent the formation of the secretion of the thyroid gland, which results in toxic goitre.

Claimed to be the first specific for this ailment, the new compound is essentially 2-thiouracil and is derived from urea. It is being marketed as a prescription item, in view of its high potency.

Oil-Soluble DDT Concentrate

An oil-soluble DDT concentrate which contains twenty-five per cent DDT in a new solvent mixture is now being manufactured by Hercules Powder Company.

This concentrate is designed for the economical formulation of residual-type DDT sprays, either alone or in combination with small proportions of other toxicants which contribute quick knockdown and kill characteristics. It is available only to insecticide manufacturers.

American-Marietta Names Yocum Ad. Manager

Grover M. Hermann, president, American-Marietta company, paint manufacturers, has announced the appointment of Weldon O. Yocum as director of advertising for the parent company and eight divisions in the United States and Canada.

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CANADIAN NEWS

Chemical Exports at New High in 1945

Canadian exports of chemicals for 1945 reached an all time high of $111.3 million, up $10.7 million over the preceding year and $24 million over 1943, it is reported by the Bureau of Statistics. The major gain has been recorded in foreign sales of fertilizers which advanced from $24 million to $30.4 million.

Comparative figures for main categories, in millions of dollars, and with 1944 totals bracketed, are: Acids $2.8 ($2.3); alcohols, $5.4 ($8.9); medicinals, $5.7 ($4.3); paints and varnishes, $4.0 ($2.5); soap, $4.0 ($1.5); calcium compounds, $4.0 ($5.7); soda compounds, $5.4 ($4.2); and inorganic chemicals not otherwise classified, $12.7 ($4.9).

Although the Dominion's chemical exports have progressed steadily from the $23.7 million of 1939, to the $28.4, $38.5, $53.0, and $86.4 million of ensuing years, a heavy proportion of the foreign trade in chemicals must be regarded as abnormal, war-generated demand.

Nevertheless, a number of manufacturers of more specialized chemicals, pharmaceuticals, and allied products, are hoping to bolster their foreign sales by capitalizing on the $2¼ billion economic vacuum in export markets which has been created by the elimination of Germany.

The Department of Commerce is endeavouring to stimulate such interests in overseas trade and has recently released a detailed survey of Germany's pre war exports, classified both by consuming countries and commodities.

Cat Cracker Installation Planned by Imperial

With work expected to begin in the spring and ultimate cost to be several million dollars, Imperial Oil Ltd., Toronto, affiliate of Standard Oil Co. (N. J.) is embarking on a general modernization and expansion of its Montreal refinery. One feature of the program will be the construction of Canada's first catalytic cracking plant utilizing the fluid catalyst process.

In addition to this 11,000 barrel-per-day fluid catalyst cracking plant, other new installations planned include a 13,200 barrel-per-day crude distillation unit, a light ends recovery plant, and a 4200 barrel-per-day non-selective catalytic polymerizer.

New storage tanks with a capacity of more than a half million barrels of oil will also be completed to permit refining at a uniform rate of 27,400 barrels a day throughout the year.

Standard Chemical Acquires Interest in Dominion Tar

Agreement on financial and other general policies has been reached between the management of Dominion Tar and Chemical Co. Ltd., and Standard Chemical Co. Ltd., which has recently acquired a substantial block of Dominion Tar stock.

As a result, a voting agreement is planned to "secure continuity in the management and policy of the company" with one of the three voting trustees being a nominee of Standard Chemical. The voting trust is scheduled to operate until Feb. 1, 1951, but may be terminated on any date after Feb. 1, 1948 if all the trustees should so determine.

Of considerable significance is the extension of Standard Chemical's holdings in the salt business by its investment in Dominion Tar, for, apart from being a major producer of coal tar chemicals, the latter company also ranks as Canada's second largest salt refiner.

Standard, which entered the salt business last year with the purchase of the third-ranking producer, Goderich Salt Co. Ltd., and later formed another salt mining concern in Nova Scotia, now may well have realized top financial interest in the Canadian salt market.

Chemical Imports Hold

Canadian imports of chemicals and allied products, almost 90 per cent of which originate in the U. S. A., totalled $79.7 million during 1945, to register a fractional decline from the $80.8 million of 1944, according to a preliminary estimate made by the Bureau of Statistics. Although imports have been running about ten per cent below corresponding 1944 figures during the last quarter the total dollar value still remains as approximately double pre war importations.

Imports for the year, by main groups, in millions of dollars, and with 1944 totals bracketed, are as follows: Acids, $3.3 ($3.3); cellulose products, $5.3 ($4.9); drugs and medicines, $9.5 ($7.6); dyeing and tanning materials, $8.3 ($7.0); explosives, $0.9 ($5.6); fertilizers, $3.7 ($4.3); paints and varnishes, $8.7 ($7.5); potash and compounds, $0.7 ($0.6); soda and compounds, $3.6 ($4.6); inorganic chemicals not classified, $11.3 ($11.9).

Ferro Enamel Builds New Plant

Ferro Enamel Co. (Canada) Ltd., subsidiary of the Cleveland organization of the same name, has completed plans for the construction of a $500,000 plant at Oakville, Ont. for the manufacture of porcelain frits, and enamels.

The new unit, which will be in production by August, will replace the company's existing Ottawa, Ont. facilities.

Glidden Expands Toronto Operations

Glidden Co. of Canada Ltd. is constructing a $200,000 addition to its Toronto plant which will approximately double its productive capacity. Special equipment is also being installed to permit the manufacture in Canada of Spred, the company's flat, water-mix paint, and Spred-Luster, its water-mix oil enamel.

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MARKET OUTLOOK

Steel Strike Affects Chemical Outlook

Synthetic Detergents Hold Much Promise

Large Streptomycin Output Planned

Paintmakers' Raw Materials to Ease

Domestic Essential Oils to Be Ample

Natural Rubber Prospects Improve

Varnish Gum Imports Lag

Market Review

●

Many Chemicals Affected By Steel Strike

While a basic settlement of the steel strike has been effected, the real pinch in the supply of cokeoven by-products, and the long list of derivatives, is only beginning. The entire coal tar intermediate position is likely to grow worse before any improvement can be expected.

The interruption in the flow of coal tar chemicals has had far reaching ramifications in the chemical industry and will create crises in important fertilizer, plastics, dyestuffs, insecticides, and pharmaceuticals.

The lost output of ammonium sulfate is directly reflected in fertilizer prospects, and proves particularly serious at this time, coincident with heavy spring shipping. Even before the strike, sulfate was oversold, and production for the year was estimated at 800,000 tons—down 100,000 tons from 1945.

Curtailment of the supplies of natural phenol will affect resin producers, and phthalic anhydride tonnage has already fallen off due to the shortage of naphthalene which will be reflected in alkyd manufactures. Cresylic acid and cresol are tighter than any other group and repercussions in the availability of tricresyl phosphate will have its influence on plasticized vinyl resins.

Unless the benzol position improves, which is improbable at this writing, aniline oil and dimethyl aniline will tighten and restrict dyestuff operations. Sulfa drugs are likewise expected to be affected by the depleted stocks of pyridine.

It is currently improbable that the coal tar industry will be fully able to meet 1946 demands for its products, and although the government is encouraging imports little relief can be anticipated from overseas. Another feature, which does not brighten the picture, is the possibility that a coal crisis may develop in a matter of weeks.

Synthetic Detergents Loom As Major Industry

The manufacture of synthetic detergents looms as one phase of the chemical industry scheduled for tremendous expansion within the next few years, as these war-proven products are made available for industrial and household consumption. Already five major chemical companies have laid plans for plant extensions, which will boost productive capacity from its present 100 million pounds per annum to about three and a half times that figure.

Sold at first to textile mills and metal working trades, synthetic detergents were just entering general markets when the war channelled most of the output to high priority industry, and limited plant expansion possibilities. Now, broad plans are being laid for extending the use of detergents in industry, and for promoting the sale of these "soapless soaps"—in the form of powder, flakes, and liquids—to the public.

The new detergents are not expected to replace soap, or reduce soap sales, but makers feel that they may realize a supplemental volume of 15 per cent of soap production within the next few years. The attainment of such an objective would mean a $60 million per annum synthetic detergent output—sizeable business for the chemical industry.

Streptomycin Production Plans Crystallizing

That streptomycin is slated to become

Market Review

Heavy Chemicals — Domestic demand for a number of heavy chemicals was somewhat less pressing during the month as a result of the steel strike and labor difficulties in other consuming industries.

Sodium nitrite, eased with a reduction in meat packers' needs, and sulfuric acid sales tapered from industries other than fertilizers. Ample supplies of caustic potash, acetic acid, and anhydrous ammonia were forthcoming, and the chlorine picture brightened considerably.

However, grave shortages in soda ash and caustic soda continued to exist, with a year-long stringency forecast for these materials. Likewise, potassium permanganate, sodium hydrosulfite, sodium and potassium carbonate were difficult to obtain, with oxalic acid in a similar category. Nickel sulfate deliveries lagged, and labor difficulties experienced by a leading copper sulfate producer resulted in market firming. Developments in this commodity will bear close watching, for even though it is off-season in so far as domestic consumption is concerned, indications are that a sizeable tonnage may be taken out of the market for the account of a government export agency.

Fine Chemicals — The DDT market strengthened markedly during the month as a result of reports that the government might buy one-half this year's output.

Imported tartaric acid and tartrates continued to sell below the recently reduced prices of domestic producers although evidence of market stabilization appeared in the offing. Acetylsalicylic acid, bismuth salts, antipyrene and lanoline remained in short supply, and added interest developed in quinine with the arrival of cinchona products from Holland. Enquiries for vanillin and coumarin failed to uncover any sizeable stocks on hand, but cod liver oil deliveries improved.

The price of thioglycollic acid was reduced sharply by a major producer, foreshadowing wider applications in the cosmetic field, and as an intermediate for the manufacture of rubber chemicals. Sodium perborate, although still scarce, is slated to ease shortly as a result of the government's diminished requirements for the basic peroxide.

Agricultural Chemicals — The steel strike affected ammonium sulfate output so seriously that now an over-all shortage of mixed fertilizers this year seems inevitable, particularly in that labor trouble in Chile threatens to reduce nitrate arrivals from that country. Broadened use of ammonium nitrate may provide some alleviation, but increased domestic production of sodium nitrate cannot be counted upon in the light of the soda ash scarcity.

Heavy demand is keeping superphosphate producers under pressure, and output is being limited only by the availability of raw materials and manpower. Inventories, however, are depleted.

Potash salts are being rapidly absorbed from the small stocks on hand. No Russian imports are reported afloat at present, and any such shipments cannot be expected until late in the season.

large dollar volume business is indicated by the fact that currently some twelve companies are producing the antibiotic in pilot plant quantities, and six penicillin producers are constructing major streptomycin plants. Although the steel strike, and consequent delay in equipment delivery, has forced deferment of production plans until late summer, substantial output will be realized this year.

If, as clinical reports suggest, streptomycin becomes at least as important as penicillin, a $100 million per annum chemical industry is in the process of formation.

Essential Oil Prospects

Limited improvement in the supply of domestic essential oils is foreseen for early this year by the Dept. of Commerce, although the tight market in imported materials is expected to continue.

Peppermint and spearmint oil requirements can be adequately provided, and production of lemon oil will be stepped up as a result of the larger lemon crop. In the meantime, easing of lemon oil supplies depends on the leveling off of government requirements, release of surplus government stocks, and possible additional arrivals of Italian oil.

Orange oil from domestic producers appears likely to increase and imports of Brazilian oils probably will aid the present limited supply position.

Smaller production in France of floral and essential oils, expanded home consumption, and government export control, render improbable the receipt of any substantial quantities from that source. Some definite allotments of Chinese oils, anise, and cassia are being offered subject to arrival in this country, but transportation problems and monetary considerations complicate the outlook.

Paintmakers Face Slow Recovery

Although no early relief from the serious shortages of raw materials which have beset paint and varnish manufacturers is in prospect, the worst is now believed to be past and slow but steady improvement in the supply situation is forecast. No real approach to normalcy is expected to be realized, however, until the latter half of the year.

Drying oils face the longest recovery period, and the speed with which the relief will come is dependent on world supplies of edible and inedible fats and oils. Total output of soybean, corn, peanut, and cottonseed oil will be nearly the same as last year, according to present indications, but an exceptionally small crop of cottonseed last year points to an overall reduction in production of domestic oils from 1945. If some soybean can be released for other than food purposes the bumper crop would bolster drying oil supplies.

If oil quotas are to be maintained to paintmakers, some 6 million bushels of Argentine flaxseed must reach the U. S. before July, together with larger quantities of castor and oiticica oils from Brazil. The U. S. flaxseed crop, estimated at 600 million pounds of oil, should provide substantial relief in the last half of the year.

Pigment supplies, with the possible exception of lead, should ease within a few months and the lessening of Navy needs for titanium oxides after mid-year will affect lithopone favorably. Zinc oxide is easier now than during the war, with stocks at 27,000 tons compared with the 10,000 ton war level.

The copperas shortage, brought about by the steel strike, has tightened the iron oxide market temporarily, and fuel and power shortages in Spain have adversely affected Spanish oxide output.

Naval stores, nitrocellulose, and chrome greens are scarce, but slated for improvement. Speculative activities by shellac collectors will result in a continued shortage unless accumulated stocks force early sale to the U. S. market.

Unlimited Natural Rubber Two Years Away

If natural rubber receipts continue during the next six months at current estimates, the industry may be able to use 25 per cent of the natural product to 75 per cent of general purpose synthetic, in place of the present 10-90 per cent proportion, according to the CPA. However, an unlimited supply of natural rubber is not expected to be available for another two years.

Difficulties of restoring production in the Far East are slowing the return of prewar conditions, and as of Jan. 1st the national inventory of natural rubber stood at 125,000 tons, with reconversion planning based on an estimated 300,000 tons for 1946.

Natural Resin Shortage To Continue

Continued shortages in the supply of natural resins are in prospect, at least for the next several months, according to importers, and some cases may exist until early 1947.

No natural resins have as yet been shipped from the Netherlands East Indies or Malaya, and trade observers are reluctant to predict when Far East materials will be available, but emphasize that the prospects are far from encouraging.

The entire industry must be restaffed and reorganized in producing areas, and in Dutch-controlled territory such re-establishment is hampered by the chaotic economic conditions created by Japanese occupation.

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Production of helium from Bureau of Mines plants in the last five fiscal years totaled 370,787,000 cubic feet, according to the Secretary of the Interior, to establish an all-time record for the industry. Coincidentally, the Department revealed that production costs had been reduced to a new low of "considerably less than a cent per cubic foot."

The Bureau of Mines, since 1925 the sole government agency charged with helium production, constructed four additional helium extraction plants during the war, as well as expanding the existing Amarillo project. Capital expenditures amounted to $16 million for the construction of the Amarillo additions and the units at Excell, Texas, Otis and Cunningham, Kans., and at Shiprock, N. Mex.

Military and non-federal demands for helium reached their greatest peak in history during Dec. 1943, when Bureau plants shipped 14,608,700 cubic feet of gas in cylinders and special tank cars. In Sept., 1944, the monthly output peak was established when four plants extracted 14,297,700 cubic feet of helium.

According to the Bureau the creation of these new production facilities guarantees the U. S. A. a monopoly on helium for years to come and millions of feet of the gas are now going back into the Cliffside reservoir for peacetime use.

American Potash Deliveries At New High

Deliveries of American potash for agricultural and chemical use reached an all-time high in 1945 to represent the eleventh consecutive year in which deliveries exceeded those of the preceding year. The five major producers delivered during the calendar year a total of 1,585,473 tons of potash salts containing 868,186 tons of K_2O, according to data released by the American Potash Institute. This represents an increase of 52,351 tons K_2O or 6.4% over 1944, the previous high year.

During 1945, 695,076 tons K_2O were delivered for agricultural purposes within the continental U. S., an increase of 42,816 tons over 1944. Canada, Cuba, Puerto Rico, and Hawaii received 44,454; 4,070; 19,048; and 10,776 tons respectively. Other exports amounted to 8,897 tons K_2O

Georgia was the leading state for agricultural deliveries with 64,816 tons K_2O, followed in order, by Ohio, Florida, Virginia, and Illinois, all receiving in excess of 50,000 tons K_2O during the year.

The most popular potash material for fertilizer use was the 60% muriate of potash grade, representing approximately 79% of the total K_2O delivered for agricultural purposes. The 50% muriate of potash grade made up 8% of the total; the sulphate forms, sulphate of potash and sulphate of potash-magnesia, 8%; and manure salts, 5%. In an endeavor to deliver the maximum potash with the minimum number of box cars and thus decrease delivery costs, the potash producers increased their agricultural deliveries of high-grade muriate in 1945 by 49,820 tons K_2O or 8.7% and their 50% muriate by 11,950 tons K_2O or 22.7% over 1944, whereas the low-grade manure salts were reduced 14,260 tons K_2O or 27.8%. Practically no change occurred in the quantity of sulphate of potash delivered whereas the sulphate of magnesia increased somewhat.

A record tonnage of potash salts was delivered also to the chemical industries in the United States during 1945, consisting of 131,469 tons of high-grade muriate equivalent to 82,456 tons K_2O, and 5,247 tons sulphate of potash equivalent to 2,713 tons K_2O, a total of 85,169 tons K_2O. This represented an increase of 2,971 tons K_2O or 3.6% over 1944. In addition, 689 tons K_2O were delivered to Canada for chemical purposes.

In the fourth quarter of 1945, potash deliveries for agricultural purposes in the continental United States amounted to 178,127 tons K_2O, in Canada to 12,716 tons, in Cuba to 1,193 tons, in Puerto Rico to 3,998 tons, in Hawaii to 2,569 tons, and other exports to 5,038 tons. Agricultural deliveries in the fourth quarter totaled 364,497 tons of potash salts equivalent to 203,641 tons K_2O compared with 363,929 tons of potash salts and 194,687 tons K_2O in the fourth quarter of 1944.

Total chemical deliveries in the fourth quarter of 1945 amounted to 27,430 tons of salts equivalent to 17,149 tons K_2O, of which 16,683 tons were chemical grade muriate, 276 tons sulphate of potash for the United States, and 190 tons K_2O as muriate for Canada. In the corresponding period in 1944 total chemical deliveries were 21,127 K_2O.

Lead and Zinc Output Down in 1945

In 1945 the total mine production of recoverable lead and zinc in the United States and Alaska (including that made into pigments and chemicals direct from ore) was 387,942 short tons of lead and 615,927 short tons of zinc, the smallest outputs since 1938 and 1939, respectively, according to preliminary figures of the Bureau of Mines, United States Department of the Interior.

These figures compare with a production of 416,861 short tons of lead and 718,642 short tons of zinc in 1944, indicating decreases of 7 percent in the output of lead and 14 percent in the production of zinc.

The greatest single factor contributing to the over-all decline in output of both metals was the critical shortage of man-

GELATIN, GLUE, AND BONE BLACK

The statistics on gelatin, glue and bone black contained in this release continue the monthly series initiated by the Bureau of the Census with the report for October 1945. Reports on glue and gelatin were formerly issued by the Chemicals Bureau of the War Production Board as "Facts for Industry," Series 6-4.

This information was compiled from the reports for 44 plants of which 12 produce gelatin, 30 make glue, and 5 manufacture bone black. All plants in the United States known to be manufacturing these three products are covered in this report. Figures by months on gelatin and glue for the years 1942, 1943, and the first six months of 1944 are available in the "Facts for Industry" release Series 6-4-1, dated December 1, 1944. Comparable data for following months through June 1945 appear in subsequent issues. For edible gelatin only, comparable quarterly data prior to 1942 appear in the Survey of Current Business, published by the Bureau of Foreign and Domestic Commerce.

Item	Production 1945 December	1945 November	1945 October	1944 December
Gelatin, total (pounds	3,350,392	3,304,048	3,451,592	3,591,000
Edible	2,142,192	2,257,014	2,291,580	2,358,000
Technical	121,168	99,277	119,901	140,000
Pharmaceutical	303,043	402,379	421,680	204,000
Photographic	783,989	545,378	618,431	889,000
Glue, total (pounds)	10,613,157	11,358,411	12,250,688	11,372,000
Bone glue, total	5,642,607	6,066,288	6,587,257	6,102,000
Green bone	[1]4,764,379	5,233,880	5,273,004	4,668,000
Extracted bone	878,228	832,408	1,314,253	1,434,000
Hide glue, total	4,970,550	5,292,123	5,663,431	5,270,000
Low grade	2,019,035	2,135,910	2,345,706	
Medium grade	1,233,642	1,494,819	1,531,578	
High grade	1,121,142	1,158,119	1,219,829	(2)
Extra high grade	596,731	503,275	566,318	
Bone black, total (short tons)	1,023	959	991	
Cane sugar, refiner's grade	642	619	561	(2)
Corn syrup, refiner's grade	206	151	233	
Pigment grades (fines)	175	189	197	

[1] Proportion of estimate, 12 per cent.
[2] Not available.

power reportedly greater during the latter months of 1945 than at any time during the war period. The total value of the metals produced in 1945 was $66,726,024 for lead and $141,663,210 for zinc dropped nearly 50 per cent. For the same reason magnesium chloride requirements were so reduced that the output of all magnesium compounds dropped more than 60 per cent.

The agricultural, household, and most of the industrial demands for salt were well maintained in 1945, but the metallurgical and some of the chemical uses declined. The result was an over-all drop of about 3 per cent from the all-time high of 1944. Total value of sales reached about $44,700,000. The chemical and particularly the fertilizer demands for sulfur stimulated an increase of 9 per cent in the value of sales which reached about $61,600,000, an all-time high. Pyrites sales increased slightly. Barite was in heavy demand particularly for well drilling muds. The requirements of lithopone and barium chemical industries were also high. As a consequence barite sales made a remarkable advance of 35 per cent above the all-time high of 1944. Sales value reached about $4,800,000. Because of strong glass and fertilizer requirements sales of boron minerals increased moderately. Sales of bromine, important in the manufacture of anti-knock gasoline, were 3 per cent greater than the all-time high of 1944. On the other hand, because of a drastic decline in the military demands for lithium salts, production of these commodities dropped to about one-tenth of the 1944 figure. Strontium production also declined considerably.

Mineral Output Shows Slight Decline

The value of minerals and mineral products in the U. S. A. and Alaska in 1945 exceeded the eight billion dollar mark for the third consecutive year, according to the Bureau of Mines preliminary estimate which places last year's output at $8,060,000,000.

Compared with 1944, last year's total mineral production showed a 4.6 per cent decrease, resulting largely from a reduced output of metals, according to the estimates of the Economics and Statistics Branch of the Bureau. On the other hand, both mineral fuels and other nonmetallic minerals showed an increase in 1945 over 1944.

The drop in production of metallic products was due chiefly to a reduction in demand, especially for steel, labor shortages at the mines, restrictions on gold production, depleted ore reserves, and in some cases, inadequate price incentives. The value of metallic products declined from $2,340,000,000 in 1944 to $1,890,000,000 in 1945.

In addition to the lower steel production in 1945, the Bureau reported that the production of gold, silver, copper, lead, zinc, iron ore, aluminum, magnesium, manganese ore, tungsten, mercury, and molybdenum was substantially less that year. The production of vanadium was maintained close to the 1944 rate, and that of titanium minerals and a few more of the rare minerals increased.

The value of the mineral fuels, such as petroleum, coal and natural gas, increased last year to $5,237,000,000 from the 1944 figure of $5,212,000,000, according to the Bureau's report. The peak production in petroleum more than offset the declines in the production of bituminous coal and anthracite. Natural gas and natural gasoline production also rose to new highs in 1945.

The production of nonmetallic minerals other than fuels increased 4 per cent last year, rising from $900,000,000 in 1944 to $940,000,000 in 1945 despite the decline in

CHEMICALS
UNITED STATES PRODUCTION, DECEMBER 1945

Statistics on the production of chemicals shown in the following table are a continuation of the series initiated on February 7, 1944, in "Facts for Industry," Series 6-1-1. With the end of the war, the list of chemicals covered was reviewed and those presented here were selected for continuation. While considerably curtailed, this group of chemicals and gases is fairly representative of the products of the inorganic chemicals industry, and provides sufficient information for gaging the broad changes in operations from month to month. This list is subject to change if future developments indicate that additional chemicals should be covered or that certain of those on which data are now published have relatively small interest. The figures shown here represent the primary production of the various chemicals in the United States, including quantities produced for consumption in the producing plant, produced for intra-company transfer and produced for sale. Data on consumption and stocks in producing plants, included in this release through September 1944, are no longer collected.

Chemical and Basis	*Unit*	*Production* — *December (Preliminary)*	*Production* — *November (Revised)*
Ammonia, synthetic anhydrous[1]	Short tons	45,557	45,298
Ammonium nitrate (100% NH_4NO_3)	Short tons	39,929	39,678
Ammonium sulfate, synthetic (technical)	M pounds	16,724	16,015
Calcium arsenate (100% $Ca_3(AsO_4)_2$)	M pounds	(2)	1,403
Calcium carbide (commercial)	Short tons	41,364	44,610
Calcium phosphate:			
Monobasic (100% $CaH_4(PO_4)_2$)	M pounds	5,176	6,793
Dibasic (100% $CaHPO_4$)	M pounds	8,163	7,518
Carbon dioxide:			
Liquid and gas	M pounds	14,926	*16,412
Solid (dry ice)	M pounds	36,501	*41,511
*Chlorine	Short tons	94,805	*91,461
Chrome green (C.P.)	M pounds	1,613	*1,527
Chrome yellow and orange (C.P.)	M pounds	4,391	*4,825
Copper acetoarsenite (Paris green)	M pounds	(2)	287
Hydrochloric acid (100% HCl)	Short tons	*29,037	30,026
Hydrofluoric acid:			
Anhydrous (100% H_2F_2)	M pounds	3,053	*3,973
Technical (100% H_2F_2)	M pounds		
Hydrogen	Millions of cubic feet	1,472	*1,414
Lead arsenate (acid and basic)	M pounds	5,514	*4,225
Methanol (natural) (100% CH_3OH)	M gallons	236	*202
Molybdate chrome orange (C.P.)	M pounds	380	*356
Nitric acid (100% HNO_3)	Short tons	33,033	*31,352
Oxygen	M cubic feet	889,422	*873,453
Phosphoric acid (50% H_3PO_4)	Short tons	68,231	70,409
Silica gel:			
Desiccant grade	M pounds	3,981	*2,769
Aviation gas catalyst grade	M pounds		
Silver nitrate (100% $AgNO_3$)	M ounces	3,647	*3,067
Soda ash (commercial sodium carbonate):			
Ammonia soda process—			
Total wet and dry (98-100% Na_2CO_3)[4]	Short tons	379,786	355,039
Finished light (98-100% Na_2CO_3)[5]	Short tons	197,682	177,737
Finished dense (98-100% Na_2CO_3)	Short tons	128,643	123,237
Natural[6]	Short tons	14,919	15,283
Sodium bicarbonate (refined) (100% $NaHCO_3$)	Short tons	16,814	15,692
Sodium bichromate and chromate	Short tons	6,769	*6,999
Sodium hydroxide (caustic soda):[7]			
Electrolytic process—			
Liquid (100% NaOH)	Short tons	90,322	*85,678
Solid (100% NaOH)	Short tons	16,549	16,073
Lime—soda process—			
Liquid (100% NaOH)	Short tons	63,102	62,516
Solid (100% NaOH)	Short tons	20,494	20,340
Sodium phosphate:			
Monobasic (100% NaH_2PO_4)	Short tons	1,180	1,307
Dibasic (100% Na_2HPO_4)	Short tons	6,094	*5,947
Tribasic (100% Na_3PO_4)	Short tons	8,710	8,299
Meta (100% $NaPO_3$)	Short tons	2,538	2,740
Tetra (100% $Na_4P_2O_7$)	Short tons	4,268	4,104
Sodium silicate:			
Soluble silicate glass, liquid and solid (anhydrous)	Short tons	29,276	*28,781
Sodium sulfate:			
Anhydrous (refined) (100% Na_2SO_4)	Short tons	7,205	9,530
Glauber's salt (100% $Na_2SO_4 \cdot 10H_2O$)	Short tons	13,134	13,712
Salt cake (crude) (commercial)[8]	Short tons	*46,652	*53,335
Sulfuric acid:[9]			
Total (100% H_2SO_4)	Short tons	746,183	*707,865
Chamber process (100% H_2SO_4)	Short tons	261,541	*255,853
Contact process (100% H_2SO_4)[8]	Short tons	484,642	*452,012
Net, contact process (100% H_2SO_4)[8 9]	Short tons	439,287	*402,463
Zinc yellow (zinc chromate) (C.P.)	Short tons	12	*205

[1] Data for a small amount of aqua ammonia are included in the figures reported by one company.
[2] Data cannot be published without disclosing operations of individual establishments.
[3] Proportion of estimate, 12 per cent or less.
[4] Total wet and dry production, including quantities diverted for manufacture of caustic soda and sodium bicarbonate, and quantities processed to finished light and finished dense soda ash. For detailed discussion of soda ash statistics, see "Facts for Industry," Series 6-1-1.
[5] Not including quantities converted to finished dense soda ash.
[6] Natural soda ash, crude salt cake and sulfuric acid data collected in cooperation with Bureau of Mines.
[7] Production figures represent total production of liquid material, including quantities evaporated to solid caustic and reported as such.
[8] Includes sulfuric acid of oleum grades.
[9] Excludes spent acid. For detailed explanation see "Facts for Industry," Series 6-1-1.
* Revised.

Prepared by Bureau of Census.

military requirements. A higher demand for fertilizers and a revival of the demand for building materials were responsible for this increase, according to the Bureau. New records were established for potash, sulfur, barite, feldspar, and bromine production, and there were gains over 1944 in the output of cement, sand and gravel, building stone, slate, clay and clay products, gypsum, phosphate rock, and pyrites. The production of lime, refractory materials, salt and talc was moderately lower in 1945, while major declines were recorded for magnesite, magnesium compounds, mica, and graphite.

Rayon Production Up Ten Percent

Domestic production of all types of rayon totaled 792.1 million pounds during 1945, an increase of nearly 10% over the 723.9 million pounds reported for 1944, the Textile Economics Bureau, Inc., announces.

Preliminary figures for 1945 show production in the United States responsible for approximately 60% of the world's total output of rayon filament yarn and 25% of rayon staple fibre. World output of rayon yarn and staple fibre was estimated at 1.7 billion pounds.

Domestic shipments of rayon yarn to tire manufacturers increased 62% over 1944. Shipments during 1945 totaled 195 million pounds, compared with 18 million in 1941.

This rise, according to the Rubber Manufacturers Association, resulted from increased use of rayon in large size tires which require high heat resistance.

In addition to tire uses, distribution of rayon yarn to the principal consuming trades showed the following changes, compared with 1944: Full fashioned hosiery manufacturers off 25%, seamless hosiery off 13%, narrow woven goods up 12% and miscellaneous uses off 22%.

Rayon production by chemical composition in 1945 was:

Viscose-plus-cupramonium, 448.8 million pounds, an increase of 17% over 1944. Acetate rayon yarn, 174.9 million pounds, up 2%. Staple fibre production, 168.4 million pounds, a slight decrease under 1944.

Bauxite Production Declines

A further drop of nearly 7 percent in domestic mine production of bauxite was recorded in November, continuing the decline begun in May 1945, according to the Bureau of Mines, United States Department of the Interior. Output totaled 72,163 long tons on a dried equivalent basis in November.

The decrease in production in Saline and Pulaski Counties, Arkansas, by far the most important domestic bauxite mining areas, was about three percent, but the 40 percent drop reported from Virginia, Alabama, and Georgia increased the average decline for the United States to 7 percent. A total of six companies reported output of crude bauxite during November.

Mine stocks of crude bauxite decreased about 3 percent during the month, continuing the recent trend, inasmuch as shipments to processors and consumers were substantially in excess of ore production. Direct shipments of crude bauxite to consumers in November were only a few hundred tons more than in October, whereas shipments to processors

FATS AND OILS, DECEMBER 1945
(In thousands of pounds)

Item	Factory Production Dec. 1945	Factory Production Nov. 1945	Factory Consumption Dec. 1945	Factory Consumption Nov. 1945	Stocks: Factory and Warehouse Dec. 31, 1945	Stocks: Factory and Warehouse Nov. 30, 1945
Vegetable Oils						
Cottonseed, crude	137,976	176,006	132,924	164,392	114,477	109,820
Cottonseed, refined	119,752	150,092	64,008	73,760	359,143	305,238
Peanut, crude[1]	10,289	12,329	11,039	14,065	15,816	13,510
Peanut, refined	9,596	12,609	9,333	10,020	23,209	24,534
Coconut, crude	[2]	3,597	11,490	12,545	125,169	133,713
Coconut, refined	3,679	4,635	4,307	4,671	2,038	2,199
Corn, crude	17,222	15,385	16,711	13,935	9,889	9,794
Corn, refined	16,249	12,578	2,265	1,897	5,615	5,688
Soybean, crude	118,146	124,251	97,936	94,530	133,937	116,912
Soybean, refined	91,396	88,675	81,680	94,726	71,090	73,395
Olive, edible	118	[2]	5	11	1,149	1,071
Olive, inedible	..	..	28	45	106	123
Olive, sulphur oil or olive foots	..	..	98	89	857	1,034
Palm kernel, crude	[2]	[2]	5,121	7,327	27,950	28,648
Palm kernel, refined	[2]	[2]	[2]	[2]	[2]	[2]
Palm, crude	..	..	6,570	6,532	35,731	44,067
Palm, refined	[2]	[2]	1,712	830	387	497
Babassu, crude	[2]	[2]	2,432	1,760	12,077	10,471
Babassu, refined	[2]	[2]	833	397	291	362
Rapeseed	..	..	1,002	1,459	18,158	17,929
Linseed	63,438	71,872	39,069	42,881	180,056	171,872
China wood or tung	506	[2]	1,285	1,794	6,487	6,501
Perilla	..	..	2	2	105	90
Castor No. 1, crude	8,344	8,053	6,773	6,601	8,025	7,414
Castor No. 3, crude	2,247	2,234	1,862	2,189	3,188	2,593
Castor, dehydrated	2,605	2,016	2,237	2,526	7,002	6,364
Castor, sulphonated	xxx	xxx	517	533	904	1,040
Sesame	..	..	8	3	804	1,094
Oiticica	..	..	992	1,253	10,366	10,933
All other	13,009	14,968	6,927	12,417	31,656	31,468
Animal Fats						
Lard, rendered, including neutral lard and rendered pork fat	172,193	137,139	5,990	7,668	91,533	70,068
Tallow, edible	6,416	8,846	5,383	9,038	6,336	4,984
Tallow, inedible	80,169	86,446	83,779	94,081	132,224	123,330
Neat's-foot oil	163	234	335	328	1,521	1,661
Fish and Marine Mammal Oils[3]						
Cod	120	89	857	935	3,201	2,577
Cod liver	4	85	709	903	5,706	6,109
Other liver	289	316	779	637	2,822	3,385
Other fish	[4]5,692	[5]16,465	19,217	24,518	86,630	99,346
Marine mammal	..	..	1,015	1,121	19,790	20,829
Greases						
Greases (including garbage and house), other than wool	44,388	43,014	34,453	42,209	67,963	61,265
Wool grease	1,290	1,582	1,104	1,381	4,353	4,132
Secondary Products						
Stearin, vegetable oil, winter	5,077	6,383	4,974	6,558	7,069	5,881
Stearin, animal, edible	1,956	2,207	1,411	1,802	1,488	1,396
Stearin, animal, inedible	2,009	2,719	950	1,419	1,770	1,367
Oleo oil	2,935	4,284	646	939	1,052	1,242
Grease oil and lard oil	2,971	3,796	4,729	4,317	11,727	12,477
Tallow oil	2,740	3,957	911	1,181	2,654	2,683
Vegetable oil foots, raw and acidulated soap stock (100% fatty acid content)	17,772	19,068	16,869	18,395	41,075	39,629
Foots from fish and marine mammal oil (100% basis)	[6]	[6]	926	745	2,980	3,747
Animal foots (100% basis)	1,825	1,649	1,809	1,690	511	428
Other fatty acid stock including spent and salvaged oils and fats, tall oil, palm oil refuse, etc.	12,674	14,760	8,853	9,898	27,430	25,171
Vegetable oil fatty acids from foots and other than from foots including fatty acids from tall oil, palm oil refuse, etc.	15,486	18,070	14,776	15,750	21,679	23,154
Fish and marine mammal fatty acids	3,217	3,743	721	851	3,583	3,758
Animal fat and oil fatty acids	14,393	19,280	15,933	20,900	8,113	9,909
Red oil or oleic acid	5,390	5,412	4,235	4,848	[9]9,346	[8]8,716
Stearic acid	4,069	4,394	3,783	4,226	[9]8,444	[10]8,157
Other Products						
Glycerin, crude (100% basis)	11,759	13,427	12,531	14,366	11,780	8,595
Glycerin, high gravity and yellow distilled (100% basis)	5,234	5,612	5,825	6,395	16,342	15,901
Glycerin, chemically pure (100% basis)	6,391	7,750	6,109	7,143	17,596	18,346
Hydrogenated oils, edible	79,256	88,702	72,744	77,931	30,495	32,303
Hydrogenated oils, inedible	14,415	19,832	18,365	19,876	11,480	13,513
Shortening	101,867	121,930	601	581	33,095	39,725
Winterized vegetable oils	20,704	23,508	xxx	xxx	30,305	30,529

[1] Bureau of Agricultural Economics collected the data on production and stocks from crude peanut oil producers.
[2] Included in "All other" vegetable oils.
[3] Fish and Wildlife Service collected the data from fish oil producers.
[4] Includes 4,599,000 pounds of herring, sardine, and pilchard and 780,000 pounds of menhaden for December.
[5] Includes 10,610,000 pounds of herring, sardine, and pilchard, and 4,962,000 pounds of menhaden for November.
[6] Not shown to avoid disclosure of individual operations.
[7] Includes 1,722,000 pounds held by producers December 31.
[8] Includes 1,774,000 pounds held by producers November 30.
[9] Includes 796,000 pounds held by producers December 31.
[10] Includes 842,000 pounds held by producers November 30.

gained 4 percent over the preceding month.

Shipments of dried, calcined, and activated bauxite from processing plants decreased nearly 22 percent in November and were only about 40 percent as much as those in June. The largest share of the decline was in shipments to the alumina industry, owing to reduced demand for aluminum metal. Shipments to the abrasive and refractory industries increased 19 percent during the month, but shipments to chemical and other industries decreased.

PLASTICS AND SYNTHETIC RESINS
November 1945

Item	Shipments and Consumption (In pounds) November 1945	October 1945
Cellulose acetate and mixed ester plastics:[1]		
Sheets:		
Continuous (under .003 gauge)	568,082	513,742
Continuous (.003 gauge and upward)	645,274	588,396
All other sheets, rods and tubes	446,904	430,798
Molding and extrusion materials	6,171,003	6,114,096
Nitrocellulose plastics:		
Sheets	899,082	857,622
Rods and tubes	598,550	567,894
Phenolic and other tar acid resins:		
Laminating (dry basis)	2,141,700	1,918,181
Adhesives (dry basis)	542,188	598,289
Molding materials[1]	9,613,359	10,855,503
All other (dry basis)[2]	2,334,605	2,997,756
Urea and melamine resins:		
Adhesives (dry basis)	2,424,619	2,221,341
Textile and paper treating (dry basis)	465,466	636,809
All other (dry basis)[2]	262,124	71,547
Polystyrene	1,859,561	1,778,879
Vinyl resins:		
Sheeting and film[1]	1,179,795	1,458,855
Textile and paper coating resins (resin content)	1,102,032	1,491,575
Molding and extrusion materials[1]	4,852,897	4,194,258
Adhesives (resin content)	328,992	278,076
All other (resin content)[2]	478,571	326,437
Miscellaneous plastics and resins:		
Molding and extrusion materials[1 3]	4,110,975	*4,188,856
All other (dry basis)[2 4]	1,891,137	2,123,822

* Revised.
[1] Includes filler, plasticizers and extenders.
[2] Excludes data for protective coating resins.
[3] Includes data for ethyl cellulose, urea and melamine, acrylic acid and miscellaneous molding and extrusion materials.
[4] Includes petroleum resins, acrylic acid ester resins, mixtures and miscellaneous synthetic resin materials.

Fertilizer Exports Up But Imports Shade

Exports of fertilizers and fertilizer materials in November 1945 continued the sharp rise which had been so pronounced in recent months, according to the monthly summary prepared by The National Fertilizer Association. Export tonnage in the month was 52 per cent larger than in November 1944. This followed increases of 47 per cent in October, 31 per cent in September and 120 per cent in August over the same periods of 1944.

November exports totaled 128,000 tons, valued at $2,560,000. Included in the total were 10,800 tons shipped under the lend-lease program and 5,400 tons shipped for UNRRA.

Principal increases in November 1945 over November 1944 were in exports of nitrogenous chemicals, high grade hard rock and superphosphate. Declines took place in land pebble rock, potash and prepared mixtures.

Approximately 27,500 tons of phosphate rock were shipped to Australia and New Zealand in November. Important quantities of nitrogenous materials were exported to France, the Netherlands and Poland, but Canada and Latin America accounted for the greater part of total November tonnage of all materials.

January-November exports amounted to 916,000 tons, with a stated valuation of $15,365,000. This represented increases of 11 per cent in tonnage and 7 per cent in value over 1944. Included in the total were 167,000 tons shipped under lend-lease and 53,000 tons shipped for UNRRA.

Imports of fertilizer materials in November, The National Fertilizer Association reports, totaled 78,000 tons valued at $2,435,000. Both tonnage and value were considerably below November 1944. The principal decline was in sodium nitrate. Another drop was in imports of phosphate rock from North Africa, which amounted to 4,600 tons in November 1945 and to 17,260 tons in November 1944.

Imports in the first 11 months of 1945, aggregating 1,584,000 tons valued at $40,794,000, exceeded the corresponding period of 1944 by 29 per cent in tonnage and 26 per cent in value. The increase in total tonnage over 1944 was 359,000 tons. The principal increases were as follows: 263,000 tons in nitrate of soda; 34,500 tons in calcium cyanamide; 12,000 tons in ammonium sulphate; and 33,000 tons in phosphate materials.

Lead and Zinc Pigments And Zinc Salts in 1945

All pigments in the group covered by the lead and zinc pigments canvass trended downward in 1945, according to the Bureau of Mines, United States Department of the Interior. Lead pigments decreased more than the zinc group, as was to have been anticipated, because of the difference in the relative abundance of the crude materials for their manufacture.

Some lead and zinc pigments and zinc salts, sold by domestic manufacturers in the United States, 1943-45, in tons:

	Tons 1943	1944	1945[1]
Basic lead sulphate[2] or sublimed lead—			
White	4,752	5,253	4,100
Blue	845	1,080	
Red lead	53,378	53,972	45,400
Orange mineral	79	284	35
Litharge	113,091	138,203	132,300
White lead—			
Dry	39,525	46,466	27,400
In oil[3]	36,642	39,260	23,400
Zinc oxide	143,402	140,675	127,600
Leaded zinc oxide	43,828	64,395	63,000
Lithopone	135,723	142,905	136,600
Zinc chloride, 50°B	53,707	57,545	56,800
Zinc sulphate	15,649	17,156	21,100

[1] Designated as shipments in 1945.
[2] Exclusive of basic lead sulphate used for the manufacture of leaded zinc oxide which is included in tonnages shown for that pigment.
[3] Weight of white lead only.

PLASTIC WATER PAINTS, COLD-WATER PAINTS AND CALCIMINES
November 1945
Compared with preceding months

The statistics presented in the following table are based on data reported by 38 identical manufacturers who accounted for approximately 87 per cent of the total value of plastic texture paints, cold-water paints and calcimines in the United States, as reported in the Biennial Census of Manufactures, 1939. For comparable figures beginning January 1945, and an explanation of certain changes which affect previously published data, see "Facts for Industry," Series M19K-85, released November 12, 1945.

Products	November	October
Plastic-Texture Water Paints, Total:[1]		
Value	$67,869	$68,096
Pounds	1,011,783	1,008,756
Cold Water Paints, Total		
Value	$476,531	$470,214
Interior, total value	$270,484	$258,832
Casein and other protein bound:		
Paste and semipaste form—		
Gallons	153,678	147,445
Value	$200,716	$189,531
Dry powder form—		
Pounds	768,507	736,027
Value	$59,763	$57,877
Glue bound—		
Pounds	225,781	274,562
Value	$10,005	$11,424
Exterior, total value	$206,047	$211,382
Casein and other protein bound:		
Pounds	303,080	322,733
Value	$19,597	$20,054
Lime and/or cement bound—		
Pounds	2,423,906	2,476,621
Value	$186,450	$191,328
Calcimines, Total:		
Pounds	1,965,476	1,672,320
Value	$92,116	$78,039
Hot water—		
Pounds	870,211	640,477
Value	$39,235	$27,908
Cold water—		
Pounds	1,095,265	1,031,843
Value	$52,881	$50,131

[1] Includes Paste and Dry Powder Plastic-Texture Water Paints which cannot be shown separately without disclosing operations of individual companies.

Sulfur Production At Record Level

December completed the most active year in the history of the domestic sulfur industry, according to the Bureau of Mines, United States Department of the Interior. Production and mine shipments established all-time records. Shipments declined somewhat after the Japanese surrender, but production continued at record levels.

Production and apparent sales of native sulfur in the United States in selected periods, 1944-45, in long tons, are listed below:

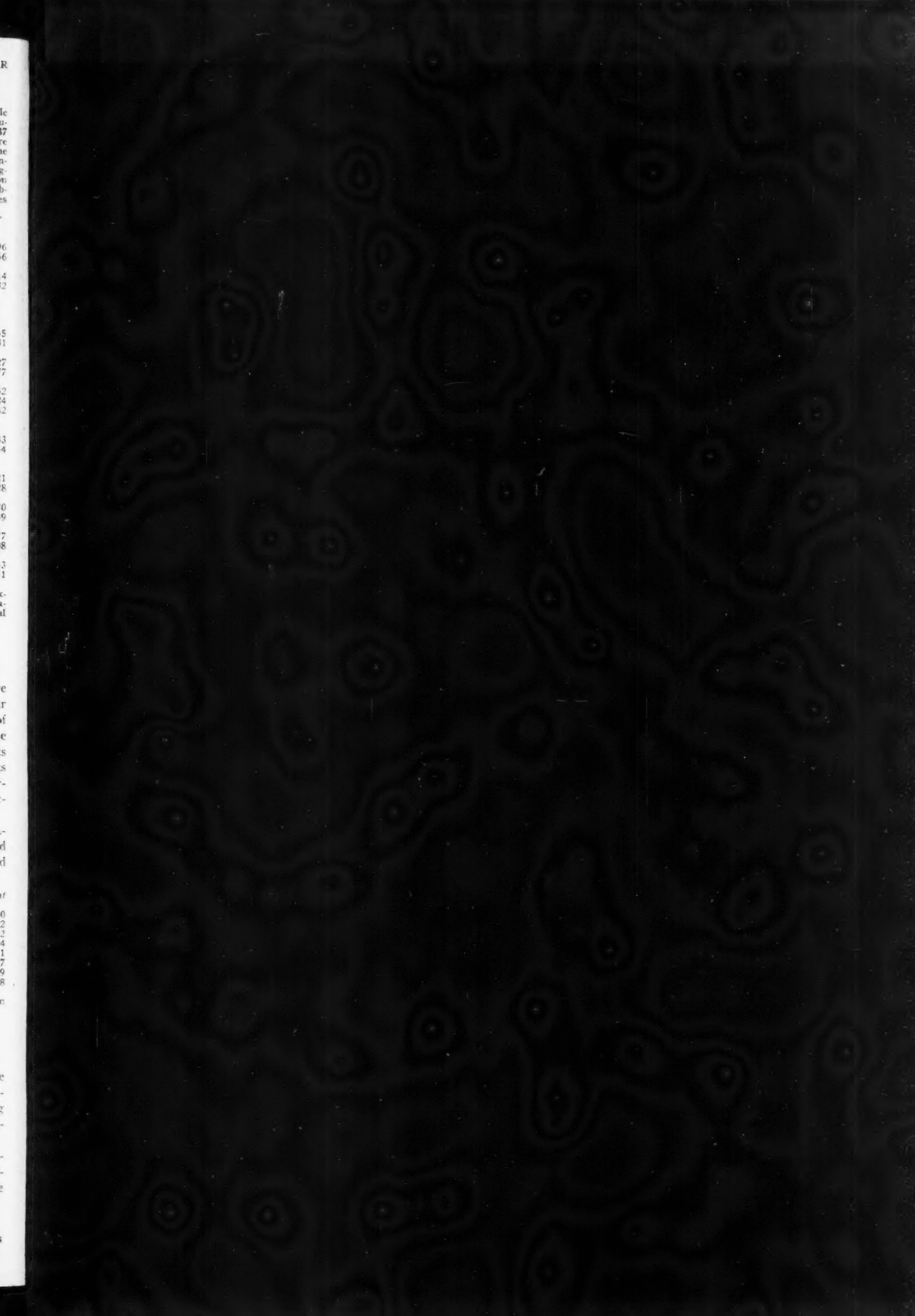
Period	Production	Apparent sales*
December 1945	331,843	244,260
November 1945	323,738	266,132
December 1944	280,580	269,882
November 1944	293,551	314,324
1945	3,753,188	3,849,591
1944	3,218,156	3,580,057
Monthly average 1945	312,766	320,799
Monthly average 1944	268,180	298,338

* Calculated from production and change in stocks during the period.

Essential Oil Business At New High

The potential volume of business in the essential oil industry has appreciated considerably in the last few years, according to Talmadge B. Tribble, MM & R vice-president.

Present anticipated volume for the industry during 1946 is estimated at $60 million, or three times that charted three years ago.



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BENZYL CHLORIDE
BENZYL CYANIDE
DIETHYL MALONATE
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ACETYLTANNIC ACID, U. S. P. (chemical name for Tannigen)
ALBUMIN TANNATE, U. S. P. (chemical name for Tannalbin)
ANTIPYRINE SALICYLATE, N. N. R.
BETA NAPHTHYL BENZOATE, N. N. R.
CALCIUM BENZYL PHTHALATE, pure
BENZYL DISULFIDE
CALCIUM IODOBEHENATE, U. S. P.
CALCIUM LEVULINATE, pure
CAMPHOSULFONATES
CAMPHORIC ACID, C. P.
ETHYL CHAULMOOGRATE, U. S. P.
METHENAMINE ANHYDROMETHYLENECITRATE
HEXAMETHYL — DIAMINOISOPROPANOL-DI-IODIDE Quaternary Ammonium Compound (chemical name for Endoiodin and Iodisan)
• • • •
THYMOLPHTHALEIN
O-CRESOLPHTHALEIN
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CURRENT PRICES

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00
February, 1944, $0.890 *February, 1945, $0.874*
February, 1946, $0.859

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Acetaldehyde,99%,drs.wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs, ...lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv. .....lb.	.06	.07	.06	.07	.06	.07
ACIDS						
Acetic, 28%, bbls ....100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. .....100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks. .....100 lbs.	6.93	7.25	6.93	7.25	6.93	7.25
Acetylsalicylic, Standard USP .....lb.	.40	.54	.40	.54	.40	.54
Benzoic, tech. bbls. .....lb.	.43	.47	.43	.47	.43	.47
USP, bbls, 4,000 lbs. up lb.	...	.54	...	.54	...	.54
Boric tech, bbls. c-l. ..tons *a*	...	109.00	...	109.00	...	109.00
Chlorosulfonic, drs, wks. ..lb.	.03	.04½	.03	.04½	.03	.04½
Citric, USP, crys, gran, bbls. .....lb. *b*	.20	.21	.20	.21	.20	.21
Cresylic 50%, 210-215° HB, drs. wks. frt. equal gal.	.81	.83	.81	.83	.81	.83
Formic, 85%-90% cbys. .lb.	.10	.11½	.10	.11½	.10	.11½
Hydrofluoric, 30% rubber, dms. .....lbs.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks ...lb.	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs ...lb.	.25	.26	.25	.26	.25	.26
Muriatic 18° cbys ....100 lb.	1.50	2.45	1.50	2.45	1.50	2.45
20° cbys, c-l, wks. ..100 lb.	...	1.75	...	1.75	...	1.75
22° cbys, c-l, wks. ..100 lb.	...	2.25	...	2.25	...	2.25
Nitric,36°,cbys, wks 100 lbs. *c*	5.00	5.25	5.00	5.25	5.00	5.25
38°, c-l, cbys, wks 100 lbs. *c*	...	5.50	...	5.50	...	5.50
40°, c-l, cbys, wks 100 lbs. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lbs. *c*	...	6.50	...	6.50	...	6.50
Oxalic, bbls, wks .....lb.	.11¼	.12½	.11¼	.12½	.11¼	.12½
Phosphoric, 100 lb. cbys, USP .....lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic tech, bbls .....lb.	.26	.42	.26	.42	.26	.42
Sulfuric, 60°, tks, wks ..ton	...	13.00	...	13.00	...	13.00
66°, tks, wks .....ton	...	16.50	...	16.50	...	16.50
Fuming 20% tks, wks..ton	...	19.50	...	19.50	...	19.50
Tartaric, USP, bbls .....lb.	.70½	.71	.70½	.71	.70½	.71
Alcohol, Amyl (from Pentane) tks, delv .....lb.	...	.131	...	.131	...	.131
Butyl, normal, syn, tks lb.	...	.10¾	...	.10¾	...	.10¾
Denatured, CD 14, c-l drs .....gal. *d*	...	.613	...	.613	...	.59
Denatured, SD, No. 1, tks.*d*	...	.542	...	.542	...	.52
Ethyl, 190 proof tks...gal.	...	17.65½	...	17.65½	...	17.60
Isobutyl, ref'd, drs ....lb.	...	.0660	...	.0660	...	.086
Isopropyl ref'd, 91%, dms .....gal.	.38	.41	.38	.41	.37½	.66½
Alum, ammonia, lump, bbls, wks .....100 lb.	...	4.25	...	4.25	...	4.25
Aluminum, 98-99% ...100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd l.c.l. wks lb.	.09	.12	.09	.12	.08	.12
Hydrate, light, bgs. ....lb.	...	.14½	...	.14½	.14½	.15
Sulfate, com'l. bgs, wks, c-l .....100 lb.	1.15	1.25	1.15	1.25	1.15	1.25
Sulfate, iron-free, bgs, wks .....100 lb.	1.75	2.00	1.75	2.00	1.75	2.10
Ammonia anhyd, cyl ....lb.	...	.14½	...	.14½	...	.14½
Ammonia, anhyd. fert. tank cars, wks. frt. equalized ton	...	59.00	...	59.00	...	59.00
Ammonium Carbonate, USP, lumps, dms ....lb.	.08¼	.09½	.08¼	.09½	.08¼	.09¼
Chloride,whi,bbls,wks,100 lb.	4.45	5.15	4.45	5.15	4.45	5.15
Nitrate, tech. bags, wks. lb.	.0435	.0450	.0435	.0850	.0435	.0850
Oxalate pure, grn. bbls. lb.	...	.23	...	.23	.27	.33
Perchlorate, kgs .....lb.	no stocks		no stocks		no stocks	
Phosphate, dibasic tech. bgs .....lb.	.07	.07¾	.07	.07¾	.07	.08½
Stearate, anhyd. dms....lb.		.34		.34		.34
Sulfate, dms, bulk ....ton	28.20	29.20	28.20	29.20	28.20	29.20
Amyl Acetate (from pentane) tks., delv. .....lb.	...	.14½	...	.14½	...	.15½
Aniline, Oil, drs .....lb.	.11½	.12½	.11½	.12½	.11½	.12½
Anthraquinone, sub, bbls...lb.	...	.70	...	.70	...	.70
Antimony Oxide, bgs ....lb.	.15	.16	.15	.16	.15	.16
Arsenic, whi, kgs—powd. lb.	.04	.04¾	.04	.04¾	.04	.04¾

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; y Price given is per gal; c Yellow grades 25c per 100 lbs less in each case; *d* Prices given are Eastern schedule, *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid is ½c higher.

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Barium Carbonate precip, wks, bgs. ton	60.00	75.00	60.00	75.00	60.00	75.00
Chloride, tech, cyst, bgs, zone 1 ton	73.00	78.00	73.00	78.00	73.00	78.00
Barytes, floated, bbls. ton	...	36.00	...	36.00	...	36.00
Bauxite, bulk mines ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde,tech,cbys,dms lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, tks, ft all'd gal.	...	.15	...	.15	...	.15
Benzyl Chloride, cbys lb.	.20	.21	.20	.24	.22	.24
Beta-Naphthol, tech, bbls, wks ton	.23	.24	.23	.24	.23	.24
Bismuth metal, ton lots lb.	...	1.25	...	1.25	...	1.25
Blanc Fixe, 66⅔% Pulp, bbls, wks ton	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks,100 lb.	2.50	3.10	2.50	3.60	2.50	3.60
Borax, tech, c-l, bgs ton	...	45.00	...	45.00	...	45.00
Bordeaux Mixture, drs lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases lb.	.21	.23	.21	.23	.21	.30
Butyl, acetate, norm. drs lb.	18.95	19.45	18.60	19.45	17.90	19.45
Cadmium Metal lb.	.90	.95	.90	.95	.90	.95
Calcium, Acetate, bgs, 100 lb.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs ton	50.00	90.00	50.00	90.00	50.00	95.00
Carbonate, c-l bgs ton	18.00	22.00	18.00	22.00	18.00	22.00
Chloride, flake, bgs c-l ton	18.50	35.00	18.50	35.00	18.50	35.00
Solid, 73-75% drs, c-l, ton	18.00	34.50	18.00	34.50	18.00	34.00
Gluconate, U.S.P., drs. lb.	.57	.59	.57	.59	.57	.59
Phosphate, tri, bbls, cl lb.	...	.0635	...	.0635	...	.0635
Camphor, U.S.P., gran, powd, bbls lb.	.69	.71	.69	.71	.69	.71
Carbon Bisulfide, 55-gal drs lb.	.05	.05¼	.05	.05¼	.05	.05¼
Dioxide, cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52½ gal. drms lb.	.73	.80	.73	.80	.73	.80
Casein, Acid Precip, bgs, 100 or more lb.	...	.24	...	.24	...	.24
Chlorine, cyls, lcl, wks, contract lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract lb.	...	.05¼	...	.05¼	...	.05¼
Liq. tk, wks, contract 100 lb.	...	1.75	...	1.75	...	1.75
Chloroform, tech, drs lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude bbl.	8.25	8.75	8.25	8.75	8.25	8.75
Cobalt, Acetate, bbl lb.	...	.83¾	...	.83¾	...	.83¾
Oxide, black kgs lb.	...	1.84	...	1.84	...	1.84
Copper, metal 100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54%, bbls. lb.	.19½	.20½	.19½	.20½	.19½	.20½
Sulfate, bgs, wks cryst. 100 lb.	5.00	5.50	5.00	5.50	5.00	5.50
Copperas, bulk, c-l, wks ton	...	14.00	...	14.00	...	14.00
Cresol, USP, drs lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.11¾
Cyanamid, bgs ton	1.52½	1.62½	1.52½	1.62½	1.52½	1.62½
Dibutylamine, c-l, drs, wks,	...	.66	...	.66	...	.66
Dibutylphthalate, drs lb.	17.20	23.59	17.20	23.59	17.70	23.59
Diethylaniline, lb drs lb.	...	.40	...	.40	...	.40
Diethyleneglycol, drs, wks lb.	.14	.15	.14	.15	.14	.15½
Dimethylaniline, dms,cl.,lcl lb.	.21	.22	.21	.22	.23	.24
Dimethyl phthalate, drs lb.	.20	.20½	.20	.20½	.20	.20½
Dinitrobenzene, bbls lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks. lb.	.16	.20	.16	.20	.16	.20
Diphenylamine bbls lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs lb.	.35	.37	.35	.37	.35	.37
Ethyl Acetate, tks, frt all'd lb.	.0975	.1175	.0975	.1175	.0975	.1175
Chloride, drs lb.	.18	.20	.18	.20	.18	.20
Ethylene Dichloride, lcl. wks, E. Rockies, dms lb.	.0842	.0941	.0842	.0941	.0842	.0941
Glycol, dms, cl. lb.	...	.10	...	.10	...	.10
Fluorspar, No. 1, grd.95-98% bulk, cl-mines ton	...	37.00	...	37.00	...	37.00
Formaldehyde, bbls, cl & lcl lb.	.0520	.0570	.0520	.0570	.0520	.0570
Furfural tech, dms, c-l,wks lb.	...	.13	...	.13	...	.13
Fusel Oil, ref'd, dms, dlvd lb.	.18½	.19½	.18½	.19½	.18½	.19½
Glauber's Salt, Cryst, c-l, bgs, bbls, wks 100 lb.	1.05	1.45	1.05	1.45	1.05	1.45
Glycerine dynamite, dms, c-l, lb.	.17½	.18¼	.17½	.18¼	...	.16½
Crude Saponification, 80% to refiners tks lbs.	...	.11½	...	.11	.09½	.11½

GUMS

Gum Arabic, amber sorts bgs lb.	.12	.12½	.11¾	.14	.11	.13
Benzoin Sumatra, CS lb.	.52	1.00	.52	1.00	.52	1.00
Copal, Congo lb.	...	.55¾	...	.55¾	...	.55¾
Copal, East India, chips lb.	...	.53¾	...	.53¾	...	.53¾
Macassar dust lb.	...	.07⅜	...	.07⅜	...	.07⅜
Copal Manila,	.13½	.15½	.13½	.15½	.13½	.15½
Copal Pontianak, bold c-l lb.	...	.17⅜	...	.17⅜	...	.23⅜
Karaya, bbls, bxs, dms. lb.	.18	.46	.18	.46	.15	.46

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

AHCO PRODUCTS

METHYL "CELLOSOLVE"* STEARATE

METHYL "CELLOSOLVE" STEARATE, a synthetic ester, is used as a plasticizer for cellulose derivative, paper coatings and wax finishes. The following data may suggest other uses.

Chemical formula, $C_{17}H_{35}COOCH_2CH_2OCH_3$
Molecular weight 342
Color (platinum cobalt scale) 175
Melting point ..... 22° to 24°C
Flash point ..... 378°F
Acidity, less than .6 mg. KOH per gram ester
Specific gravity ..... .888 at 25°/25°C
Iodine value ..... 2 max.

Low volatility

* Trade mark of C&CCC

★

BUTYL STEARATE

BUTYL STEARATE, a synthetic ester, is used as a plasticizer for cellulose and polyvinyl derivatives, also for cosmetics, paper coatings and wax finishes. The following data may suggest other uses.

Chemical formula ..... $C_{17}H_{35}COOC_4H_9$
Molecular weight 341
Color (platinum cobalt scale) 130
Melting point ..... 19° to 20°C
Flash point ..... 358°F
Acidity, less than .6 mg. KOH per gram ester
Saponication number, 171-179 mg. KOH per gram ester
Specific gravity ..... .85-.86 at 20°/20°C
Iodine value ..... 2 max.

Low volatility

ARNOLD-HOFFMAN & CO., INC.
Manufacturing Chemists
PROVIDENCE, R. I.
Established in 1815
Plants at Dighton, Mass. and Charlotte, N. C.
NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE

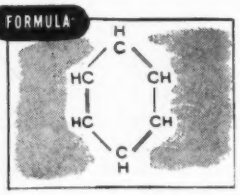
BENZOL

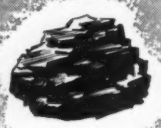
DEFINITION: Benzol (Benzene) is the parent hydrocarbon of the aromatic compounds. It is the basic raw material for the synthesis of many organic chemicals.

HISTORY: Discovered in 1825 by Faraday in an oil obtained by compressing illuminating gas. Hofmann found it in coal-tar in 1845. The process of recovering benzol industrially was first developed by Charles Mansfield.

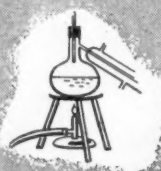
FORMULA:

C_6H_6





SOURCES: Benzol is obtained principally from the destructive distillation of coal. Most of the benzol produced in this operation is recovered by scrubbing coke-oven gas, while the balance is found in the portion of coal-tar that distills below 170°C.



CHARACTERISTICS: The pure product is a mobile, colorless liquid. It boils at 80.1°C., and crystallizes at 5.5°C. It is practically insoluble in water but mixes readily with ether, anhydrous alcohol, petroleum distillates and many organic liquids.

USES: A solvent for stains, coatings, and rubber cements; an essential raw material for the manufacture of dyes, tetryl and other explosives, synthetic rubber, phenol, aviation fuel, and D. D. T.

GRADES:

	Sp. Gr.	Boiling Range
Benzol, Nitration Pure	.882-.886	1°C max. incl. 80.1°C
Benzol, Industrial Pure	.875-.886	2°C max. incl. 80.1°C
Benzol, 90%	.870-.886	Start: Min. 78.2°C., 90% min. at 100°C
Thiophene-free Benzol	.882-.886	1°C max. incl. 80.1°C

This is one of a series of advertisements presenting information on basic coal-tar chemicals.

Awarded to the men and women of the Barrett Frankford Chemicals plant for excellence in the production of war materials.

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ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
The Barrett Company, Ltd., 5551 St. Hubert St., Montreal, Que.

Barrett

ONE OF AMERICA'S GREAT BASIC BUSINESSES

Current Prices

Gums
Salt Lake

		Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Kauri, N. Y.							
Superior Pale XXX	lb.	...	.65¾	...	.65¾	...	.65¾
No. 3	lb.	...	.22	...	.22	...	.22
Sandarac, cs	lb.	.97½	.99½	.97½	.99½	...	.99½
Tragacanth, No 1, cases	lb.	3.80	3.90	3.80	3.90	3.80	5.00
No. 3	lb.	2.15	2.60	2.15	2.60	2.15	3.00
Yacca, bgs	lb.	.06	.07¼	.06	.07¼	.06	.07¼
Hydrogen Peroxide, cbys	lb.	.15½	.18½	.15½	.18½	.15½	.18½
Iodine, Resublimed, jars	lb.	1.75	1.85	1.75	1.85	1.75	2.10
Lead Acetate, cryst, bbls	lb.	...	.12½	...	.12½	...	.12½
Arsenate basic, bg, lcl	lb.	.12	.12½	...	.12	.11½	.12
Nitrate, bbls	lb.	...	.12½	...	.12½	...	.12½
Red, dry, 95% Pb_3O_4 bbls	lb.	.09	.10¾	.09	.10¾	.09	.10¾
97% Pb_3O_4, bbls delv	lb.	.09½	.11	.09½	.11	.09¼	.11
98% Pb_3O_4, bbls delv	lb.	.09½	.11¼	.09½	.11¼	.09½	.11¼
White, bbls	lb.	.08¼	.08¾	.08¼	.08¾	.08¼	.08¾
Basic sulfate, bbls, lcl	lb.	.07¼	.08	.07¼	.08	.07¼	.08
Lime, Chem., wks, bulk	ton	6.50	9.25	6.50	9.25	6.25	13.00
Hydrated, f.o.b. wks	ton	8.50	12.00	8.50	12.00	8.50	16.00
Litharge, coml, delv. bbls	lb.	.08	.09¾	.08	.09¾	.08	.09¾
Lithopone, ordi., bgs	lb.	.04¼	.04½	.04¼	.04¾	.04¼	.04¾
Magnesium Carb, tech, wks	lb.	.07¼	.10¾	.07¼	.10¾	.06¼	.10¾
Chloride flake, bbls, wks c-l	ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, Anhyd. bbls	lb.	.15	.18	.15	.18	.15	.18
Dioxide, Caucasian bgs, lcl	ton	74.75	79.75	74.75	79.75	74.00	79.75
Methanol, pure, nat, drs gal *l*		.63	.73	.63	.73	.63	.76
Synth, drs cl gal. *m*		.31	.38	.31	.38	.31	.38
Methyl Acetate, tech tks	lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv	lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, cyl	lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd	lb.	...	.08	...	.08	...	.08
Naphtha, Solvent, tks	gal.	...	.27	...	.27	...	.27
Naphthalene, crude, 74°, wks tks	lb.	...	.0275	...	.0275	...	.0275
Nickel Salt, bbls, NY	lb.	.13	.13½	.13	.13½	.13	.13½
Nitre Cake, blk	ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks	lb.	.08	.09	.08	.09	.08	.09
Orthoanisidine, bbls	lb.	...	.70	...	.70	...	.70
Orthochlorophenol, drs	lb.	.25	.27	.25	.27	.25	.27
Orthodichlorobenzene, drms	lb.	.07	.08	.07	.08	.07	.08
Orthonitrochlorobenzene, wks	lb.	.15	.18	.15	.18	.15	.18
Orthonitrotoluene, wks, dms	lb.	...	.09	...	.09	...	.09
Paraldehyde, 98%, wks lcl.	lb.	...	.12	...	.12	...	.12
Chlorophenol, drs	lb.	.24	.27	.24	.27	.25	.32
Dichlorobenzene, wks	lb.	.11	.15	.11	.15	.11	.15
Formaldehyde, drs, wks	lb.	.21	.22	.21	.22	.21	.22
Nitroaniline, wks, kgs	lb.	.43	.45	.43	.45	.43	.45
Nitrochlorobenzene, wks	lb.	...	.15	...	.15	...	.15
Toluenesulfonamide, bbls	lb.	...	.70	...	.70	...	.70
Toluidine, bls, wks	lb.	...	.48	...	.48	...	.48
Penicillin, ampules per 100,000 units		.55	.95	.55	.95	.59	2.40
Pentaerythritol, tech	lb.	.27	.31	.27	.31	.27	.33

PETROLEUM SOLVENTS AND DILUENTS

Lacquer diluents, tks, East Coast	gal.	...	.11½	...	.11½	...	.11
Naphtha, V.M.P., East tks, wks	gal.	...	.11	...	.11	...	.11
Rubber solvents, East, tks, wks	gal.	...	.11	...	.11	...	.11
Stoddard Solvents, East, tks, wks	gal.	...	.10	...	.10	...	.10

Phenol, U.S.P., drs	lb.	.10½	.11¼	.10½	.11¼	.10½	.11¼
Phthalic Anhydride, cl and lcl, wks	lb.	.13	.14	.13	.14	.13	.14
Potash, Caustics, 88-92%, wks, s-l	lb.	.06¼	.06¾	.06¾	.06¾	.06¼	.06¾
flake, 88-92%	lb.	.07	.07½	.07	.07½	.07	.07½
liquid, 45% basis, tks	lb.	...	.02⅞	...	.02⅞	...	.0275
dms, wks	lb.	.03¼	.03½	.03	.03½	.03	.03½
Carbonate, hydrated 83-85%	lb.	...	.05½	...	.05½	.05½	.05¾
Chlorate crys, bgs, wks	lb.	.11	.13	.11	.13	.11	.13
Chloride, crys, tech, bgs, kgs	lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks	lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans	lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriatic dom, 60-62-63% K_2O bulk unit-ton	ton	...	.53½	...	.53½	.53½	.56
Permanganate, USP, wks dms	lb.	.20½	.21	.20½	.21	.20½	.21
Sulfate, 90%, basis, bgs	ton	...	36.25	...	36.25	...	36.25
Propane, group 3, tks	gal.	...	.03¾	...	.03¾	...	.03¾
Pyridine, ref., drms	lb.	.45	.45½	.45	.45½	.45½	.46
R Salt, 250 lb bbls, wks	lb.	...	.65	...	.65	...	.65
Resorcinol, tech, drms, wks	lb.	.64	.74	.64	.74	.64	.75
Rochelle Salt, cryst	lb.	.43½	.47	.43½	.47	.43½	.47
Salt Cake, dom, blk wks	ton	...	15.00	...	15.00	...	15.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.

* Spot price is ½c higher.

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Saltpeter, gran, bbls. ..100 lb.	8.20	8.60	8.20	8.60	8.20	8.60
Shellac, Bone dry, bbls. .lb. *	.42½	.46	.42½	.46	.42½	.46
Silver Nitrate, 100 oz, bots 2,500-oz. lots .....oz.	.47	.47¾	.47	.47¾	.47	.47¾
Soda Ash, 58% dense, bgs, c-l, wks .....100 lb.	...	1.15	...	1.15	...	1.15
58% light, bgs cl....100 lb.	1.05	1.18	1.05	1.18	1.05	1.13
Caustic, 76% flake drms, cl .....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms,cl 100 lb.	...	2.30	...	2.30	...	2.30
Liquid, 47-49%, sellers, tks .....100 lb.	...	1.95	...	1.95	...	1.95
Sodium Acetate, anhyd. dms .....lb.	.08½	.10	.08½	.10	.08½	.10
Benzoate, USP dms ....lb.	.46	.52	.46	.52	.46	.52
Bicarb, tech., bgs., cl., works .....100 lb.	1.55	1.90	1.55	1.90	1.55	1.90
Bichromate, bgs,wks l.c.l. lb.	.07⅞	.08⅛	.07⅞	.08⅛	.07½	.08⅛
Bisulfite powd, bbls, wks .....100 lb.	3.00	3.60	3.00	3.60	3.00	3.60
35° bbls., wks .....100 lb.	1.40	1.65	1.40	1.65	1.40	1.65
Chlorate, kgs, wks c.l....lb.	...	.06¼	...	.06¼	...	.06¼
Cyanide, 96-98%, wks ..lb.	.14½	.15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, wks lb.	.07¼	.08¼	.07¼	.08¼	.07¼	.08¼
Hyposulfite, cryst, bgs, cl, wks .....100 lb.	...	2.25	...	2.25	...	2.25
Metasilicate, gran, bbl, wks c-l .....lb.	...	2.50	...	2.50	...	2.50
Nitrate, imp, bgs .....ton	...	33.00	...	33.00	...	33.00
Nitrite, 96-98% bbl. cl. lb.	...	.06¾	...	.06¾	...	.06¾
Phosphate, di anhyd. bgs. wks. .....100 lb.	6.00	6.75	6.00	6.75	6.00	7.25
Tri-bgs, cryst, wks 100 lb.	2.70	3.10	2.70	3.10	2.70	3.45
Prussiate, yel, bbls. wks lb.	...	.11	...	.11	...	.11
Silicate, 52°, drs, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
40°, drs, wks, c-l 100 lb.	...	.80	...	.80	...	.80
Silicofluoride, bbls NY..lb.	.06½	.10	.06½	.10	.06½	.10
Sulfate tech. Anhyd. bgs .....100 lb.	1.70	2.20	1.70	2.20	1.70	2.20
Sulfide, cryst c-l, bbls, wks .....100 lb.		2.40		2.40		2.40
Solid, bbls, wks .....lb.	3.15	3.90	3.15	3.90	3.15	3.90
Starch, Corn, Pearl, bgs .....100 lb.	...	4.08	...	4.08	...	4.08
Potato, bgs, cl .....lb.	...	.0637	...	.0637	...	.0637
Rice, bgs .....lb.	no stocks		no stocks		no stocks	
Sweet Potato, bgs .....lb.	no stocks		no stocks		no stocks	
Sulfur, crude, mines ....ton	...	16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs .....lb.	.18	.30	.18	.30	.18	.30
Roll, bbls .....100 lb.	2.40	2.90	2.40	2.90	2.40	2.90
Sulfur Dioxide, liquid, cyl lb.	.07	.08	.07	.08	.07	.09
tks, wks .....lb.	...	.04	...	.04	...	.04
Talc, crude, c-l, NY ....ton	...	13.00	...	13.00	...	13.00
Ref'd, c-l, NY .....ton	13.00	21.00	13.00	21.00	13.00	21.00
Tin, crystals, bbls, wks. ..lb.	no stocks		no stocks		no stocks	
Metal .....lb.	...	.52	...	.52	...	.52
Toluol, drs, wks .....gal.	...	.32	...	.32	...	.33
tks, frt all'd .....gal.	...	.27	...	.27	...	.28
Tributyl Phosphate, dms lcl, frt all'd .....lb.	...	.49	...	.49	...	.47
Trichloroethylene,dms,wks lb.	.08	.09	.08	.09	.08	.09
Tricresyl phosphate tks ..lb.	...	.24	...	.24	...	.24
Triethylene glycol, dms....lb.	.18½	.19½	.18½	.19½	.18½	.19½
Triphenyl Phos, bbls ....lb.	.31	.32	.26	.32	.26	.31
Urea, pure, cases .....lb.	...	.12	...	.12	...	.12
Wax, Bayberry, bgs .....lb.	no stocks		no stocks		no stocks	
Bees, bleached, cakes...lb.	.62	.65	.60	.65	no stocks	
Candelilla, bgs crude ..ton	.70	.72	.62	.72	.35	.36
Carnauba No. 1, yellow, bgs, ton .....lb.	no stocks		no stocks		no stocks	
Xylol, Indus. frt all'd, tks, wks .....gal.	...	.26	...	.26	...	.27
Zinc Chloride tech fused, wks .....lb.	.05	.0535	.05	.0535	.05	.0535
Oxide, Amer, bgs, wks..lb.	.07¼	.07½	.07	.07½	.07	.07½
Sulfate, crys, bgs...100 lb.	3.40	4.15	3.40	4.15	3.40	4.15
OILS AND FATS						
Babassu, tks, futures .....lb.		.111		.111		.111
Castor, No. 3, bbls .....lb.	.13¾	.15½	.13¾	.15½	.13¾	.14¼
China Wood, drs, spot NY lb.	.39	.41	.39	.41	.39	.41
Coconut, edible, drs NY...lb.		.0985		.0985		.0985
Cod Newfoundland, dms..gal.	.88	.90	.88	.90	.85	.90
Corn, crude, tks, wks ....lb.		.12¾		.12¾		.12¾
Linseed, Raw, dms, c-l ...lb.		.1550		.1550		.1550
Menhaden, tks		.1225		.1225		.1225
Light, pressed, drs l.c.l lb.		.1300		.1300		.1300
Palm, Niger, dms .....lb.		.0865		.0865		.0865
Peanut, crude, tks, f.o.b. wks .....lb.	.12⅞	.13⅞	.12⅞	.13⅞	.12⅞	.13⅞
Perilla, crude dms, NY ..lb.	no stocks		no stocks		no stocks	
Rapeseed, New Orleans, bulks .....lb.	...	.1156½	...	.1156½	...	.1156½
Red, dms .....lb.	.13¼	.14¼	.13¼	.14¼	.12¼	.14¼
Soy Bean, crude, tks, wks lb.		.1175		.1175		.1175
Tallow, acidless, bbls.....lb.	...	.14¼	...	.14¼	...	.14¼

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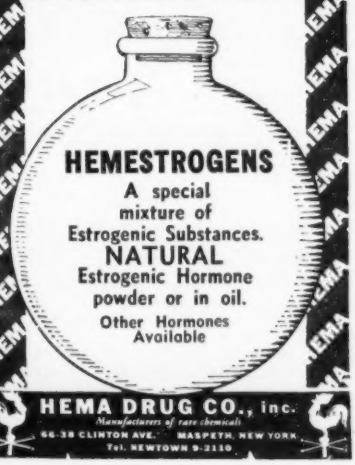

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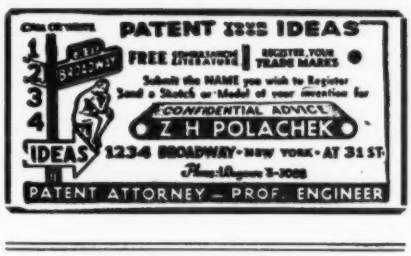

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Europe Needs Chemicals

(*Continued from page 412*)

most of the foreign-held patents which had been found to be of commercial value for use under American conditions before the war started, had been licensed or sold to American companies. Those not so disposed of and held by enemy aliens were vested by the Alien Property Custodian.

In Europe, on the other hand, patents are issued (and for protection are required) by every nation, each with patent laws and policies differing in some detail from the others. Starting with a dominating position, and the fact that the conditions in Europe hampered the development of effective competition, the Germans were able to further secure their position through the holding of patents and refusal to license others in Europe. In many cases this continued even after expiration of patents. (Were such a situation to prevail in the United States, its solution could be effected by the action of our government.)

The postwar status of these patents will be of major importance to the reconstruction of the European economy.

While this post-war status is being determined and as patent licensing is still an accepted reciprocal practice, American firms have an excellent opportunity for exploiting their inventions in the reconstruction of Europe. This applies both to alternate products or processes developed to circumvent German patents and to inventions in entirely new fields.

Now that the shooting war is over we must recognize that we represent only a small fraction of the world population, that we measure the standard of living in terms of availability of manufactured goods and that other people have different standards. While there is a definite demand all over the world for more manufactured goods at lower prices, the approach to our standards can only be attained over a long term. The various countries of the world are as jealous of their independence and sovereignty as we are. They will make every effort to accomplish their own reconversion and readjustment and will devise their own rules for internal and international commerce to fit their particular requirements. We can influence them toward our views, but we cannot force their adoption by all. If it is the policy of our government to foster international trade by our industries, these should be permitted to operate in conformity with conditions prescribed in foreign countries.

Our chemical enterprises (in fact all American industrial enterprises) can render greater assistance in the rebuilding of the prosperity of the European people and they should be willing to contribute from a purely business viewpoint. This can either be done by companies acting alone or by the concerted efforts of various companies in trade associations. In either case a changing interpretation of our anti-trust and fair trade laws is a definite deterrent to active participation. This has exposed all those who in the past have conducted foreign business according to the accepted international procedures to be adjudged a criminal before trial in court. American industry is willing to abide by the rules of conduct established but they must be clearly defined and not subject to various interpretations.

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"WE" – EDITORIALLY SPEAKING

THERE SEEMS to be a great divergence of opinion on the proper adjective to use in describing the peculiar and characteristic property of U-235 and plutonium nuclei. We have seen "fissible" and "fissionable," and a usually reliable authority reports that he has heard the incredible malaprop "fishable."

We ourselves were going to put an end to this confusion by coining a new word. We consulted our faithful friend, Webster's dictionary, and discovered that "fission" was derived from the Latin *findere,* to split. Just as we were about to utter the word "findible" and thereby bring a new word into being, our eyes wandered up the column a few lines and we discovered "fissile." Now we are happy, and we shall hereafter refer to the atomic bomb as the "fissile missile."

BEING VERY DEVILISH today, we also suggest that if the bomb travels at supersonic speed, it is a "fissile missile without a whistle."

NEVER BEFORE, to our knowledge, has there been so much interest among chemists in regard to their professional status. Many words are being bandied about, both in speeches and in the press, concerning the best means to attain universal recognition of this status. For those who have taken up the sword and buckler to wage this battle, we propose the following motto which we came across in our reading of Bacon:

"I hold every man a debtor to his profession; from the which as men of courage do seek to receive countenance and profit, so ought they of duty to endeavor themselves, by way of amends, to be a help and ornament thereunto."

FROM NATIONAL ANILINE'S publication, *Dyestuffs,* we learn that "In Scotland salt was in high repute as a charm, and the salt box was the first chattel to be removed to a new dwelling. When Robert Burns, in the year, 1789, was about to occupy a new house at Ellisland, he was escorted on his route along the banks of the River Nith by a procession of relatives, and in their midst was carried a bowl of salt resting on the family Bible."

Taking a look around at the caustic soda and chlorine industry, who would dare say that salt hath lost its charms?

SCIENCE, like betting on the races, depends a great deal on hunches and usually with more profitable results. An interview with Dr. Suits, General Electric's director of research, published in *The American Magazine* quotes him:

"If we want more Edisons . . . our schools will have to de-emphasize mere memory drills and start teaching intuition. For intuition can be taught. We've proved that right here in Schenectady. . . .

"It may never be that courses in hunch-heeding become a part of the curriculum of every school and college. But there are some things each of us can do to encourage his own intuition. Form the habit —characteristic of creative people—of reacting *Yes* to a new idea. *First,* think of all the reasons why it's good; there will be plenty of people around to tell you why it won't work. . . .

"Cultivate the art of conversation. For some people, discussion helps to crystallize the shapeless thoughts that have been lurking in the corners of the mind. You may surprise yourself by uttering bright ideas you didn't know you had. . . .

"Finally, aim to keep an open mind. Don't rely too much on logic. Be on the alert for hunches, and whenever you feel one hovering on the threshold of your consciousness welcome it with open arms."

FOR THOSE of you who treasure obscure little chemical facts, we are joyful to report that Marco Polo, in the 13th Century, writes of flat cakes of salt, bearing the stamp of the Great Khan, which were used as money in Tibet.

When the next person, in after-dinner small talk, asks you what the 13th Century Tibetans used for money. . . .

WE TREMBLE in sympathy with the manufacturers of the new soapless detergents, who have the job on their hands of indoctrinating the American housewife with the belief that suds are worthless after all. She has been taught for years that no Monday morning is completely satisfying unless the laundry room is covered to a depth of 4½ feet with fluffy white froth, enveloping her washing machine, her tubs, and herself in a misty nebula.

All we can do is to offer the use of the following jingle, license free, to those who would attempt the task of reorientation:

Skimpy Suds, Skimpy Suds,
No useless foam with Skimpy Suds!

Fifteen Years Ago
From Our Files of March, 1931

Congress finally agrees on a compromise bill providing for direct governmental operation of the Muscle Shoals power plant. The bill is vetoed, however, by President Hoover, and the Senate fails to muster enough votes to override.

Freeport Texas Co. expands into the manganese field by acquisition of a controlling interest in Cuban American Manganese Corp., owners of extensive manganese deposits in Cuba. Initial capacity of the Cuban plant will be 100,000 tons of 50% manganese ore per year.

The ICC has issued an order on petition of the du Pont Co. to permit the shipment in tank cars of a new refrigerant known as "dichlorodifluoromethane."

Niacet Chemicals Corp. directors have elected James A. Rafferty, president; James W. McLaughlin a vice-president, and J. Carlisle Swaim, secretary.

Paul Logue has been named chemical director of the Swann companies by Theodore Swann, president of the Swann Corp.

Drs. Roark and Cotton of the Department of Agriculture, have obtained a patent on the use of ethylene oxide as a fumigant and insecticide. They are said to have applied in time to obtain free use of the material for the American people. The Patent Office recognized the priority of their claim over that of I. G. Farbenindustrie.

Thirty Years Ago
From Our Files of March, 1916

Workmen at Thomas A. Edison's phenol plant, at Silver Lake, N. J., return to work after a week's strike. They accepted the offer of the company to increase their pay to 26 cents per hour, with time and a quarter for overtime. The company will also furnish rubber boots and gloves needed in carrying out the hazardous work.

Dow Chemical Co. announces the production of ethylene glycol and dichloroacetic acid, the first plant in America successfully to undertake their manufacture.

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PATENTS AND TRADEMARKS

Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 579, No. 5—Vol. 580, Nos. 1, 2, 3 (Oct. 30-Nov. 20)—p. 642

Ceramics

Tempering glass sheets or other glass articles wherein sheets are heated to temperature approximating softening point of glass and then suddenly cooled by being subjected to direct action of air under pressure. No. 2,388,808. Gerald White to Libbey-Owens-Ford Glass Co.

Lead glass composition characterized by ease of working combined with high electrical resistivity, containing SiO_2, PbO and alkali metal oxides, and oxides of Sr, Ba and Mg. No. 2,388,866. John Partridge to General Electric Co.

In mineral wool apparatus, means for disintegrating stream of molten material into fibers, comprising rotor having a cylindrical surface on which stream impinges, etc. No. 2,388,935. Edward Powell to Johns-Manville Corp.

Refractory body having high electronic emission when heated consisting of metal of tungsten and molybdenum and their alloys of foraminate structure coated with electron emitting oxides. No. 2,389,060. Jacob Kurtz to Callite Tungsten Corp.

Glass composition for sealing to iron having following: SiO_2, PbO, Al_2O_3, Li_2O, Na_2O, and K_2O. No. 2,389,305. Raymond Goodwin to General Electric Co.

Ceramic member having high physical properties comprising, porcelain body and smooth insulating glaze, composed of silicon dioxide, alumina, alkali metal oxides selected from potassium, sodium, and lithium oxides, and balance including manganese oxides and fluxing oxides. No. 2,389,386. Ralston Russell, Jr., to Westinghouse Electric Corp.

Preparing unitary monolithic ceramic capacitors wherein dielectric layers comprise a vitreous composition and electrode layers comprise metallic silver. No. 2,389,419. Alden Deyrup, Kermit Ballard and John Strickarz to E. I. du Pont de Nemours & Co.

Preparing electrical capacitor comprising plurality of vitreous enamel dielectric layers separating fired silver electrode layers. No. 2,389,420. Alden Deyrup to E. I. du Pont de Nemours & Co.

Foundry binder comprising non-swelling montmorillonite clay with dry boric acid. No. 2,389,538. Arnold Pavlish and Chester Austin to Peerpatco, Inc.

Foundry binder consisting of bentonite clay together with compound selected from anhydrous calcium sulphate, plaster of Paris, and gypsum. No. 2,389,539. Arnold Pavlish and Chester Austin to Peerpatco, Inc.

Preparing foundry binder, which comprises subjecting bonding clay to autoclaving at superatmospheric pressures. No. 2,389,540. Arnold Pavlish and Chester Austin to Peerpatco, Inc.

Composition for foundry purposes, which comprises, subjecting dry pulverized southern bentonite bonding clay to treatment at 200° F., then blending with silica sand. No. 2,389,541. Arnold Pavlish and Chester Austin to Peerpatco, Inc.

Foundry binder, which comprises treating bonding clay with calcium sulphate. No. 2,389,542. Arnold Pavlish and Chester Austin to Peerpatco, Inc.

Preparing foundry binder, which comprises subjecting dry pulverized montmorillonite or kaolinite bonding clays treated with calcium sulphate to treatment at 200° F. No. 2,389,543. Arnold Pavlish and Chester Austin to Peerpatco, Inc.

Coatings

Non-blocking hot melt coating composition consisting of cellulose acetate butyrate, and an acetone viscosity of 5-200, an antioxidant, and mixture of dibutyl sebacate and butyl stearate, composition adapted to give a non-tacky abrasion resistant coating. No. 2,387,773. Martin Salo and Harold Vivian to Eastman Kodak Co.

Non-blocking hot-melt coating composition consisting of cellulose acetate Butyrate, antioxidant, and mixture of di-2-ethyl hexyl phthalate and butyl stearate. No. 2,387,774. Martin Salo and Harold Vivian to Eastman Kodak Co.

Removing finish compositions from painted, varnished, and lacquered surfaces, disintegrating coating by covering finish coating with solvent composition, comprising alcohol, petroleum naphtha, paraffin wax and oil-soluble amine. No. 2,388,082. Joseph Roediger to Standard Oil Development Co.

Preparing coating compositions which comprises forming aqueous suspension of material from minerals and pigments, incorporating raw starch therein and subjecting resulting mixture to action of liquefying enzyme. No. 2,388,526. William Craig to R. T. Vanderbilt Co. Inc.

Paint or coating composition comprising solution of condensation derivative of rubber, a drying oil and organic diisocyanate. No. 2,388,656. Joy Lichty and Nelson Seeger to Wingfoot Corp.

Applying thin coating of adhesive containing rubber to spaced cords in sheet form. No. 2,389,459. Isidore Remark and Vaughn Wheeler to The General Tire & Rubber Co.

Dyestuffs

New azo dyestuffs of general formula A–N=N–B in which A is residue of coupling component and B is residue of a diazotized N-para-aminophenyl 5-amino-1, 3-benzodioxole. No. 2,387,848. Hans Lecher and John Goulding to American Cyanamid Co.

Manufacture of azo-dyestuff, which comprises treating with nitrating agent in presence of a sulphonating agent a monoazo-dyestuff which is free from sulphonic and carboxylic groups. No. 2,387,987. Friedrich Felix and Werner Zurcher, deceased, by Josef Zurcher, administrator, to Society of Chemical Industry in Basle.

Manufacture of azo-dyestuffs, comprising treating with nitrating agents mono-amino-monoazo-dyestuffs, which are free from sulpho groups. No. 2,387,988. Friedrich Felix and Werner Zurcher, deceased, by Josef Zurcher, administrator, to Society of Chemical Industry in Basle.

Metallizable polyazo triazine dyestuffs. No. 2,387,997. Otto Kaiser to Society of Chemical Industry in Basle.

Dyestuff composition for printing textile fibres, comprising ester salt of a leuco vat dyestuff and stable salt of quaternary ammonium base containing as solubilizing group, substituent not ionogenically bound with ammonium nitrogen atom, this substituent being of class of OH, COOH and SO_2H. No. 2,388,285. Roger Ratti and Philipp Brandt to Durand & Huguenin A. G.

Production of dyestuff comprising condensing quinaldine methiodide with 5-acetanilido-methenyl-N-methyl-rhodanic acid in presence of pyridine and fusing product with quinaldine and ethyl-p-toluene sulphonate and heating fused product with pyridine. No. 2,388,963. Douglas Fry and John Kendall to Ilford Ltd.

Equipment and Apparatus

Apparatus for making blocks of ice or similar material comprising cell having heat conducting side walls, means for maintaining in communication with said cell a constant supply of liquid at a level to fill said cell, etc. No. 22,689. George Hill to General Electric Co.

Device for purifying fluid comprising roll of embossed cellulose wadding having ribs and between surfaces of wadding a flexible adsorbent ma-

Patents Available for License or Sale

The Patent Office is regularly publishing a Register of Patents Available for Licensing or Sale. Patents concerning chemical products and processes appear below.

January 8, 1946

Pat. 1,898,500. **Enamel Decorating Process.** Patented Feb. 21, 1933. Process of applying colors in a dry or powdered state which are later fused into enamel coating for ranges, refrigerators, etc. Applied by means of stencils or brushes. Group 33—74. Reg. No. 883.

Pat. 2,348,465. **Process of Treating Articles for Removing Grease and Oils.** Patented May 9, 1944. Process relates to bringing a solvent or similar cleaning agent in vapor form in contact with surfaces of articles to be cleaned, such as interior of drums, etc., or tank cars. Process shortens time required for operation and permits recovery of maximum amount of cleaning agent even from very inaccessible portions, thereby minimizing waste of cleaning agent. Cooling medium is applied to hasten condensation of solvent at beginning of operation. Material drawn off by pump is observed until it becomes fairly clean. Vapor is then shut off, pressure reduced and heat applied which vaporizes any solvent in undrainable and inaccessible places which would be otherwise lost. When drums are placed in an enclosure solvent in spray form may be used as cooling medium. (Owner) Paul L. Geiringer, 11 Blake St., Newtonville, Mass. Groups 28—93; 33—64; 35—61. Reg. No. 894.

January 15, 1946

Pat. 2,330,828. **Sulphamido-Benzene-Azo-Pyrazolone.** Patented Oct. 5, 1943. Derivative of azo-pyrazolone is intended to have a therapeutic effect against streptococci and pneumococci. Inventor claims that is has improved bacteriostatic, analgesic, and antiseptic action; will not have a toxic effect and that it may be readily excreted. Examples and formulas recited in patent. (Owners) Willard T. Somerville and Irwin I. Lubowe. Address correspondence to Willard T. Somerville, 8835 Elmhurst Ave., Elmhurst, L. I., N. Y. Group 28—31—89. Reg. No. 908.

Pat. 2,330,326. **Method of Fractionating Vapors.** Patented Sept. 28, 1943. For the accurate separation and selective condensation of the constituents of a mixture of vapors of different molecular weights. By the use of a long vertical coil surrounded by an outer hot wall and an inner cold wall the area of contact of vapors and refluxing liquid is greatly increased and a temperature gradient is provided along and across the coil giving rise to the various physical principles of separation. Inventor states apparatus is applicable to petroleum, plastics, synthetic rubber, and organic chemical industries. Data on tests and folders available from inventor. (Owner) Florian V. Atkeson, General Delivery, Baltimore, Md. Groups 28, 29; 33—64; 35—32—59. Reg. No. 952.

terial containing cellulosic fiber and finely divided bauxite. No. 2,387,-714. Southwick Briggs to Briggs Clarifier Co.

Film extrusion apparatus comprising body section, a pair of spaced orifice-defining lips, means for adjusting lips along length to regulate contour of opposite sides of said orifice. No. 2,387,718. Clarence Coleman to E. I. du Pont de Nemours & Co.

Apparatus for measuring liquids comprising container sealed from atmospheric pressure, a well in which lower end of said container is disposed, a receptacle connected with bottom of well and having vent tube connected with upper part of well, etc. No. 2,387,922. Roger McBrien.

Apparatus for dispensing liquid in measured quantities. No. 2,387,923. Roger McBrien.

Spectrograph comprising means for recording spectra of substances as a curve, etc. No. 2,388,105. James Wilson to Standard Oil Development Co.

Automatic pressure control for low-temperature low-pressure fractionating columns. No. 2,388,312. Donald Douslin to Phillips Petroleum Co.

Reactor. No. 2,388,451. George Tobiasson to Universal Oil Products Co.

Chemical immersion heater comprising elongated container having closed end, lining of heat-insulating material to retard transfer of heat, charge of heating composition. No. 2,388,466. Walter Caldwell to Imperial Chemical Industries Ltd.

Regulating device for steam generators. No. 2,388,512. Guido Wunsch.

Plurality of tanks for liquid, which tanks may be of different capacity, different shape, and at different levels, system for totalizing liquid content of such tanks comprising float operated electric current varying transmitter in each tank, etc. No. 2,388,559. John Macintyre to General Electric Co.

Apparatus for homogenizing mixed liquid ingredients. No. 2,388,573. John Rhodes to The United Dairy Equipment Co.

Distillation unit comprising, first evaporator comprising casing and fire tubes within casing, second evaporator comprising casing and heat exchanger means, etc. No. 2,388,599. John Cleaver and Jules Resek to Cleaver-Brooks Co.

In lubricant conditioner, combination of flow line for lubricant, compartment containing wash fluid of higher specific gravity than lubricant, etc. No. 2,388,636. Frank Harvuot to S. F. Bowser & Co. Inc.

Device for signalling insufficient rate-of-flow of fluid comprising integral cast metal housing having vertically-extending downwardly-tapered chamber formed integrally therewithin and adapted for upward flow of fluid therethrough, etc. No. 2,388,671. Nathaniel Brewer to Fischer & Porter Co.

For measuring rate-of-flow of fluid, vertically extending elongated metering tube having vertically-varying cross-sectional area available for fluid-flow, etc. No. 2,388,672. Nathaniel Brewer to Fischer & Porter Co.

Glossmeter, system for comparing reflection characteristics of plurality of flat surfaces. No. 2,388,727. Edward Dench to Interchemical Corp.

Extracting apparatus for obtaining hydrocarbon liquid of desired volatility from mixture of gaseous vaporous hydrocarbons. No. 2,388,732. Karl Finsterbusch.

In liquid evaporator, shell for containing liquid to be evaporated and system of passages communicating with interior and exterior of shell, etc. No. 2,388,773. William Thompson to Davis Engineering Corp.

Snap action constant level device. No. 2,388,793. Lourdes McCarty to Automatic Products Co.

Apparatus for demulsifying and settling liquids, in combination, clarifying tank having inlet in base for liquid to be treated, heating chamber extending vertically within tank, etc. No. 2,388,796. Walter Mount.

Apparatus for sampling liquid flowing in channel, a channel, liquid-measuring device for maintaining definite relation between height of liquid on upstream side of measuring device and volumetric rate of flow through channel, etc. No. 2,388,801. Edmond Roetman to American Viscose Corp.

In combination with inflammable-gas conduit, a plurality of open-ended hollow tapering members disposed in axial alinement with one another and with said conduit and located adjacent to gas outlet end of conduit, etc. No. 2,389,059. Franz Kurth to Anemostat Corp. of America.

Method of and apparatus for distillation. No. 2,389,064. Allen Latham, Jr. to Arthur D. Little, Inc.

Apparatus for separation of substances of different specific gravities comprising housing having circular chamber with upper and lower ends and outlet openings, etc. No. 2,389,130. John Blizard to Foster Wheeler Corp.

Mechanism for supporting and automatically adjusting arc furnace electrodes. No. 2,389,164. William Harvey Payne.

Electrical device comprising electric condenser, dielectric of which comprises cellulosic material, evolving gases which tend to reduce vacuum in envelope, said gases including carbon monoxide, said envelope containing solid sorbent material for sorbing gases. No. 2,389,207. Edward Murphy to Bell Telephone Laboratories, Inc.

Travelling cleaning device to move along filter bed in which filter medium is composed of granular material, said travelling cleaning device comprising open-bottom caisson movable over surface of bed, etc. No. 2,389,329. Philip Streander.

Method and apparatus for contacting finely divided solid particles with fluids. No. 2,389,399. Joseph Alther to Universal Oil Products Co.

Controlling temperatures in reactions simultaneously conducted at different temperature levels in plurality of separate reaction zones. No. 2,389,-448. Lev Mekler to Universal Oil Products Co.

Homogenizing machine. No. 2,389,486. John Colony; Margaret Colony, executrix of John Colony, deceased, to Donald Colony and John Kenneth Colony.

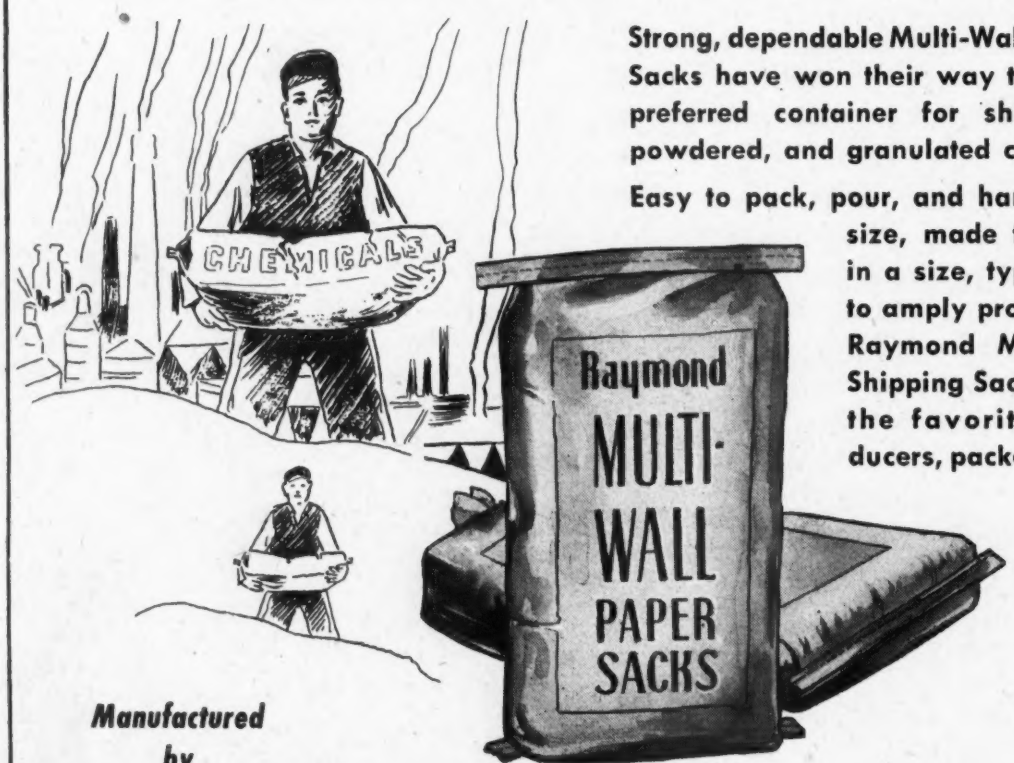
Agitating a pickling bath and controlling temperature thereof. No. 2,-389,488. William Dailey, Jr.

Chlorinating device including frame made up of end plates and cylindrical transparent cylinder, etc. No. 2,389,524. Walter Loewenstern to Houston Oxygen Co.

Explosives

Ignition composition comprising mixture of metallic acetylide, stabilizer

A Big Fellow Now in the Chemical Industry . . . and Still Growing!



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comprising abietic acid, and binder. No. 2,388,368. Guy Rolland to Atlas Powder Co.

Preparation of tripentaerythritol octanitrate. No. 2,389,228. Joseph Wyler to Trojan Powder Co.

Food

Refining sugar solution which comprises defecating solution to remove impurities, subjecting to sequential exchange action of bed of hydrogen exchange material and bed of acid adsorption material. No. 2,388,194. Henry Vallez to Infilco Inc.

Purifying sugar juice wherein juice is defecated, then clarified and cooled, then passed through plurality of parallel units, each comprising hydrogen exchange material and acid removal material. No. 2,388,195. Henry Vallez to Infilco Inc.

Purification of sugar bearing solution which comprises contacting with hydrogen exchange body, with active carbon, and with acid-adsorbing body. No. 2,388,222. Abraham Behrman to Infilco Inc.

Purification of impure sucrose solution by hydrogen exchange treatment and by anion exchange treatment. No. 2,388,224. Abraham Behrman to Infilco Inc.

Treating mass of comminuted raw beef suet which has natural moisture and fibre, in order to separate oleo-oil from mass. No. 2,388,284. Essel Ratner, one-half to Boris Pregel.

Production of high purity crystalline dextrose from starch converted dextrose solution. No. 2,389,119. Sidney Cantor to Corn Products Refining Co.

Counteracting harmful effects of grain damaged by Hemiptera of genera Aelia and Eurygaster, consisting in adding to wheat sodium chlorite. No. 2,389,302. Cyril Evans to Spillers Ltd.

Inorganic

Obtaining sodium phosphate as water soluble metathetical compound of phosphorous component of phosphate rock, and sodium component of commercial glass containing silicon and sodium oxides. No. 2,387,746. Henry Colton and Raymond Knowles and Robert Frischmuth.

Saturator for production of ammonia sulphate from coal distillation gas. No. 2,387,818. Frans Wethly to Fuel Refining Corp.

Immersion type conoscope for examining quartz crystal. No. 2,387,825. Walter Bond to Bell Telephone Laboratories, Inc.

Applying to bearing surfaces compound selected from sulphides, selenides and tellurides of tungsten, molybdenum and titanium, the compounds having plate-like physical structure consisting of layer of metallic atoms between two layers of non-metal atoms, to render compounds useful for reducing friction in bearing members. No. 2,387,872. Maurice Bell to Westinghouse Electric Corp.

Producing magnesium salts in more concentrated form from aqueous brine. No. 2,387,898. John Grebe and William Bauman to The Dow Chemical Co.

Producing soda ash from underground deposit of Wyoming trona carrying organic matter and contained iron which comprises forcing into trona formation a heated cycling brine of sodium carbonate and sodium bicarbonate. No. 2,388,009. Robert Pike.

Recovery of hydrogen fluoride from admixture with material chemically inert to organic nitrogen bases. No. 2,388,135. Frederick Frey to Phillips Petroleum Co.

Separation of hydrogen fluoride from admixture with water. No. 2,388,156. Carl Kelley to Phillips Petroleum Co.

Producing chlorine dioxide wherein chlorine gas is reacted in reaction zone with aqueous solution of a water-soluble chlorite, etc. No. 2,388,202. Erie Woodward to The Mathieson Alkali Works, Inc.

Separation of ammonia from mixture containing ammonia and trimethyl amine, comprising selectively extracting trimethyl amine, dissolving in aromatic hydrocarbon solvent chosen from xylene, toluene and benzene. No. 2,388,217. John Olin to Sharples Chemicals, Inc.

Treating sulphur dioxide-bearing gases to recover sulphur. No. 2,388,259. Edward Fleming and T. Cleon Fitt to American Smelting & Refining Co.

Adding, to hot aqueous solution of sodium tungstate and sodium carbonate, sulfuric acid to destroy all of carbonate, adding sodium hydroxide and lime to adjust pH to 9, and precipitating pure calcium tungstate. No. 2,388,306. Blair Burwell to United States Vanadium Corp.

Preparing copper arsenicals of definite composition, which consists in taking solid dicalcium arsenate, mixing it with copper bearing material. No. 2,388,496. George Pearce and Alfred Avens.

Recovery of alkali bromide and bromate from aqueous salt solutions containing bromine compounds and combined carbon dioxide. No. 2,388,586. Arthur Williamson and Frank Bradley to Imperial Chemical Industries Ltd.

Recovering sodium chromate from crude sodium chromate-bearing material involving leaching of material with aqueous liquid to form solution of sodium chromate and evaporation of water. No. 2,388,775. Marvin Udy.

Extracting aluminum hydrate from clay. No. 2,388,983. Sanford Lyons to Georgia Kaolin Co.

Alternating current rectifier comprising base provided with layer in form of selenium mixture containing selenium, selenium dioxide, a halogen salt, sulphur and iron. No. 2,389,008. Leslie Thompson and Alexander Jenkins to The Union Switch & Signal Co.

Producing sulphuric acid which comprises spraying denitrated spent sulphuric acid from manufacture of trinitrotoluene and containing organic impurities (determined as carbon) into lower end of vertically disposed reaction chamber having gas-vapor outlet at top, etc. No. 2,389,070. Henry Merriam and Andrew Harkness to General Chemical Co.

Producing sulphur dioxide by decomposing sulphuric acid containing organic reducing material. No. 2,389,071. Henry Merriam to General Chemical Co.

Regenerating exhaled air, containing carbon dioxide and water vapor, to render it fit for breathing, comprising subjecting exhaled air to mixture of barium peroxide, ferrate of barium, sodium peroxide and manganate of barium. No. 2,389,309. Nicolas Herzmark.

Aluminum silicate product and process of making same. No. 2,389,352. Elbert Fisher.

Drying agent consisting of boric oxide treated with sulphuric acid. No. 2,389,380. Leon McCulloch to Westinghouse Electric Corp.

Purifying hydrogen halide gas containing a carbon oxide impurity. No. 2,389,457. Herman Pines and Herman Bloch to Universal Oil Products Co.

Medicinal

Antispasmodics consisting of basic esters of fluorine-9-carboxylic acid. No. 2,387,879. Robert Burtner to G. D. Searle & Co.

Composition in therapeutics, comprising a 5, 5 disubstituted thiobarbituric acid derivative. No. 2,388,024. Lewis Walter to The Maltbie Chemical Co.

Stable aqueous therapeutic solution containing boric acid and riboflavin. No. 2,388,261. Douglas Frost to Abbott Laboratories.

Preparing therapeutic concentrates containing active oxytocic and pressor principles which comprises subjecting fresh posterior pituitary glands to extraction, etc. No. 2,388,417. Robert Jones to Abbott Laboratories.

Apparatus for administration of inhalant gases. No. 2,388,533. William Edmondson and Wilfred Jones to The British Oxygen Co. Ltd.

Bactericidal composition comprising betaine and a water-soluble linear polymeric amidine salt. No. 2,388,614. James Kirby and John Lontz to E. I. du Pont de Nemours & Co.

Container for aseptic filling and dispensing of sterile liquids. No. 2,388,634. Charles De Woody to Ace Glass Inc.

Manufacture of a purified non-hygroscopic calcium salt of d-patothenic acid. No. 2,389,097. Kurt Warnat to Hoffmann-La Roche Inc.

Therapeutically useful sulphones and their preparation. No. 2,389,126. Louis Bambas to Parke, Davis & Co.

Compounds of 2-sulphanilamido-5-carboxythiazole with vasoconstritors and their solutions. No. 2,389,582. Philip Winnek and Earl Bockstahler to Allied Laboratories, Inc.

Metals, Ores

Production of metal having lower melting point than iron by exothermic reaction between oxide of such metal and aluminum, which comprises including in reaction mixture metallic iron to reduce such oxide. No. 2,387,715. Charles Cadwell to The Electric Railway Improvement Co.

Electrodepositing plurality of different metals upon body which comprises making said body the cathode in a plating bath containing, in addition to cathode, a plurality of anodes corresponding to different metals. No. 2,387,772. Samuel Ruben.

Beneficiating low grade ilmenite ores to produce ore adapted to ready filtration and drying, which comprises subjecting ore to rougher silicate flotation in presence of cationic type collector, etc. No. 2,387,856. Roy Pickens to American Cyanamid Co.

Testing apparatus for determining hydrogen in steel, which comprises with heating furnace for heating sample of steel being tested, mercury reservoir, inter-connected measuring tubes immersed in mercury reservoir, etc. No. 2,387,878. William Brown to Carnegie-Illinois Steel Corp.

Combination of an ore roasting and reducing furnace. No. 2,387,882. Walter Clark to Clarkiron, Inc.

Deep-drawing steel. No. 2,387,919. James Lose.

Depositing on support a bright film of metal selected from gold, nickel, cobalt, iron, copper, aluminum, chromium and silver, which is deposited by thermal evaporation in a vacuum. No. 2,387,970. Paul Alexander.

Reduction of magnesium oxide with metallic reducing agent at elevated temperatures and under reduced pressures, which comprises forming porous aggregates consisting of mixture of magnesium oxide and calcium silicate. No. 2,387,979. Hugh Cooper to Acme Aluminum Alloys, Inc.

Electrical resistance alloy, consisting of Al, Cr, Cb, Fe. No. 2,387,980. Hugh Cooper.

Producing solution-heat-treated cast articles formed of heat-treatable magnesium-base alloy characterized by tendency to undergo germination on prolonged heat-treatment. No. 2,388,120. Robert Busk to The Dow Chemical Co.

Severely cold worked shape of alloy steel composed of carbon, manganese,

Free-machining steel containing carbon, sulphur, boron, and iron. No. 2,388,128. Joseph Eckel.

Production of metal coated sheets involving passing sheet through bath of molten coating metal and then through body of oil superposed on said bath. No. 2,388,131. Frank Fairley, Louis Lindquist, Clyde Michaels and Howard Rodgers to Tennessee Coal, Iron & Railroad Co.

Free-machining steel containing carbon, sulphur, boron, and iron. No. 2,388,214. Donald Murphy to Bethlehem Steel Co.

Free-machining steel containing carbon, sulphur, boron, nitrogen, and iron. No. 2,388,215. Donald Murphy to Bethlehem Steel Co.

Separately recovering magnetic and locked magnetite-silicious gangue particles from pulp mixture containing same together with free silica and non-magnetic oxidic iron. No. 2,388,471. Fred De Vaney to Erie Mining Co.

Hardening solution heat treated and quenched undriven rivets of aluminum base alloy containing copper and magnesium whereby head cracks are eliminated. No. 2,388,540. Ernest Hartmann to Aluminum Co. of America.

Stabilizing workability and tensile properties of age hardening type of aluminum base alloys containing magnesium and at least one of copper, silicon and zinc. No. 2,388,563. Joseph Nock, Jr. and Theodore Bossert to Aluminum Co. of America.

Making non-scalloping bimetallic sheet metal having layer of steel and layer of non-ferrous metal having low melting point. No. 2,388,694. Walter Keene and William Carlson to Superior Steel Corp.

Recovery, from stainless steel grindings, steel containing 10% to 35% chromium, with or without nickel and other alloy additions, such grindings comprising caked and loose particles. No. 2,388,731. Alexander Feild to Rustless Iron & Steel Corp.

Maintaining stress in steel within 850° to 1100° F.; including making steel of pearlitic, non-air-hardening type containing .08 to .20% carbon and .45 to .65% molybdenum in conjunction with .15 to less than 1% chromium. No. 2,389,043. Marcus Grossmann and Richard Miller, one-half to Carnegie-Illinois Steel Corp., and one-half to United States Steel Corp. of Delaware.

Electrodepositing antimony from aqueous solution comprising antimony trifluoride and ammonium fluoride. No. 2,389,131. Mortimer Bloom.

Apparatus for reducing finely-divided metallic material, combination of a housing, a horizontal hearth therein having a multiplicity of uniformly distributed, pressure-reducing gas apertures therethrough, etc. No. 2,389,133. Herman Brassert and Charles Ramseyer to H. A. Brassert & Co.

Electrodepositing metals, which comprises electrolyzing aqueous acid solution of a salt of metal to be deposited and soluble sulpho-fatty acid ester of a mixture of alcohols. No. 2,389,135. Henry Brown to The Udylite Corp.

Electrodepositing metals, which comprises electrolyzing aqueous acid solution of a salt of metal to be deposited and soluble sulphate of a water-soluble aliphatic polyhydric alcohol partially esterified with fatty acid. No. 2,389,179. Henry Brown to The Udylite Corp.

Electrodepositing metals, which comprises electrolyzing aqueous acid solution of salt of metal to be deposited and soluble sulphoacetate of a water-soluble aliphatic polyhydric alcohol partially esterified with fatty acid. No. 2,389,180. Henry Brown to The Udylite Corp.

Electrodepositing metals, which comprises electrolyzing aqueous acid solu-

tion of salt of metal to be deposited and soluble aliphatic alkyl ether sulfonate containing alkyl radical. No. 2,389,181. Henry Brown to The Udylite Corp.

Alloy for flints consisting of misch-metal, iron, 5 parts of copper and silver, nickel and chromium. No. 2,389,198. Henry Kent.

Induction furnace of submerged resistor type for melting metallic charges which form low melting segregations of easy fluidity. No. 2,389,218. Manuel Tama and Mario Tama to Ajax Engineering Corp.

Magnesium melting furnace. No. 2,389,307. Henry Griffoul.

Processing of electrical silicon steel sheets and strip, which includes hermetically sealing steel within enclosure in presence of a substance active at elevated temperatures toward nonmetallic elements, etc. No. 2,389,497. John Gat to Carnegie-Illinois Steel Corp.

Producing high-tensile strength deep-drawing steel characterized by casting effervescing steel into ingot mold, allowing steel to effervesce until solidified skin forms, casting steel of different chemical composition into ingot mold while central portion of effervescing steel is molten to displace said central portion, etc. No. 2,389,516. James Kinnear, Jr.

Heat treating castings, made of magnesium base alloys of class containing solid solution element which will, upon thermal treatment, form with magnesium a solid solution unstable at some temperature, etc. No. 2,389,583. Robert Wood and Marvin Gantz to Aluminum Co. of America.

Organic

Manufacture of di-olefines which comprises heating mono-chlorinated mono-olefine in presence of finely divided metal selected from copper and silver. No. 2,387,723. Henry Dreyfus to Celanese Corp. of America.

Producing low-boiling diolefin hydrocarbons. No. 2,387,731. John Allen to Phillips Petroleum Co.

Forming alkali metal salts of mono carboxylic amino acid. No. 2,387,735. Frederick Bersworth to The Martin Dennis Co.

N-aryltetrahydroquinolines. No. 2,387,751. Joseph Dickey and James Normington to Eastman Kodak Co.

Preparation of p-cymene from a monocyclic terpene. No. 2,387,794. Washington Hull to American Cyanamid Co.

Treating cellulose material, which comprises impregnating cellulose material with terpene hydrochloride while the hydrochloride is at or above its melting point. No. 2,387,801. Christopher Luckhaupt to Luckite Processes, Inc.

The 6a-methyltetradecahydrochrysene-5,6,-11,12-tetracarboxylic-5,6;11,12-dianhydride. No. 2,387,830. Lewis Butz to Secretary of Agriculture of the United States of America.

4-Methyl-alpha-methyl styrene from bicyclic terpenes. No. 2,387,836. James Dixon to American Cyanamid Co.

Hexide diesters of type described in patent. No. 2,387,842. Sol Soltzberg to Atlas Powder Co.

Manufacture of N,N'-dimethylhexamethylenediamine. No. 2,387,873. William Boon and Arthur Lowe to Imperial Chemical Industries Ltd.

Hydrolyzing fats by causing preheated fat and preheated water to pass in countercurrent flow in intimate contact with each other. No. 2,387,884. Robert Daniels to The Procter & Gamble Co.

Increasing inhibiting potency of phenolic wood tar fraction containing aryl-methyl ethers, which comprises reacting fraction with hydrogen halide in presence of aniline. No. 2,387,920. Charles Lowry, Jr. to Universal Oil Products Co.

Unsaturated esters and polymers thereof. No. 2,387,931. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Ester having structural formula described in patent. No. 2,387,932. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Monomeric neutral ester of (a) a monohydroxy alcohol and (b) a polyester containing carboxylic acid group. No. 2,387,933. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Composition of matter and polymerization products thereof. No. 2,387,934. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Alkylation of aromatic hydrocarbons. No. 2,387,948. Raymond Schaad to Universal Oil Products Co.

Producing carboxylic substituted amines which comprises heating aqueous solution, containing water soluble salt of alpha amino acid and aliphatic amine. No. 2,387,976. Frederick Bersworth to The Martin Dennis Co.

Production of cycloparaffin and aromatic hydrocarbons from paraffin hydrocarbons. No. 2,387,989. Arch Foster to Phillips Petroleum Co.

Preparing butadiene free from water in same fractionator wherein butadiene is separated from less volatile hydrocarbons. No. 2,387,992. Karl Hachmuth to Phillips Petroleum Co.

Separating aromatic hydrocarbons free from cyclopentadiene and methylcyclopentadiene and dimers thereof from crude aromatic oils containing aromatic hydrocarbons and cyclopentadiene and methylcyclopentadiene and simultaneously separately recovering monomeric cyclopentadiene and methylcyclopentadiene therefrom. No. 2,387,993. Harold Hepp to Phillips Petroleum Co.

Isomerization of 1-olefins to 2-olefins. No. 2,387,994. John Hilfyer to Phillips Petroleum Co.

Vapor-phase process for production of mono-ethyl benzene from ethylene and benzene. No. 2,388,007. William Pardee and Barnett Dodge to Gulf Research & Development Co.

n-Amyl-(alpha-chloroethyl) sulphide. No. 2,388,025. Lewis Walter and Louis Goodson to The Maltbie Chemical Co.

Recovery of toluene from a toluene fraction containing non-aromatic hydrocarbons boiling from fraction in same temperature range as toluene boils therefrom which comprises azeotropically distilling toluene fraction in presence of a ketone. No. 2,388,040. Charles Clark to Allied Chemical & Dye Corp.

Separating butadiene from mixture of butadiene and isobutylene while preventing formation of polymeric material, which comprises distilling mixture upward through a fractionating column down which flows solution of sulfur dioxide in acetone containing phenyl-beta-naphthylamine. No. 2,388,041. David Craig to The B. F. Goodrich Co.

Conversion of normal butane to butadiene. No. 2,388,078. Edward Reeves to Standard Oil Development Co.

Isomerizing pinane to a mixture of dihydroacyclic terpenes. No. 2,388,084. Alfred Rummelsburg to Hercules Powder Co.

Glyoxal-ketone condensation products and process of making them. No. 2,388,086. John Rust to Montclair Research Corp.

Segregation of iso-olefins from gases containing same, comprising contacting gases with a solid, high molecular weight, saturated aliphatic polymer solvent which has been produced by polymerizing low molecular weight mono-iso-olefinic hydrocarbons. No. 2,388,095. Eldon Stahly to Jasco, Inc.

Producing mixture of C4 hydrocarbons containing high proportion of butylenes. No. 2,388,099. Clare Viland and Herschel Hyde to Tide Water Associated Oil Co.

Production of terpenes. No. 2,388,100. Edward Wadley to Standard Oil Development Co.

Preparation of unsaturated ketones. No. 2,388,101. Charles Weizmann.

Oxidizing aliphatic ester having long chain acid radical and containing unconjugated double bonds until iodine value has been lowered, and dehydroxylating oxidized product. No. 2,388,122. Ivor Colbeth.

Inhibiting development of foreign taste and odor in (methoxymethoxy) ethanol and stabilizing ethanol, which comprises preparing ethanol, from ethylene glycol and methylal-methanol azeotrope using sulfuric acid as catalyst, in 18% chromium-8% nickel alloy steel vessel, there being present during reaction copper. No. 2,388,148. Harry Hetherington to E. I. du Pont de Nemours & Co.

Amides. No. 2,388,154. Morris Katzman to The Emulsol Corp.

Tetra-allyl silicane and process of preparing the same. No. 2,388,161. Edward Kropa to American Cyanamid Co.

Glycerol ether ester selected from mono and dimethoxy acetates of glycerol beta methyl ether. No. 2,388,164. Donald Loder to E. I. du Pont de Nemours & Co.

Lithium salt of organic carboxylic acid containing eight carbon atoms, which has been melted and heated below decomposition temperature, until reduction in viscosity has occurred. No. 2,388,166. William Luckenbach, Jr. to Foote Mineral Co.

Preparation of amino acids, which comprises treating aqueous solution of barium salt of N-methylamino-acetic acid with carbon dioxide. No. 2,388,189. Carl Scshweitzer to E. I. du Pont de Nemours & Co.

Forming naphthalene vapor and air mixture for vapor phase catalytic oxidation. No. 2,388,198. John Weiss to John M. Weiss & Co.

Manufacture of nitriles by dehydrogenation of amines. No. 2,388,218. John Olin to Sharples Chemicals Inc.

Cyclo pentamethylene thiocarbamyl piperidyl sulphide. No. 2,388,236. Robert Cooper to Monsanto Chemical Co.

Increasing stability of organic substance subject to deterioration through oxidation while in contact with metallic oxidation promoter comprising incorporating in substance, condensation reaction product of alpha isonitroso ketone with organic polyprimary amine. No. 2,388,255. Morris Daskais and Ellis Fields to Research Corp.

Fatty acid esters having amphoteric properties. No. 2,388,281. John Orelup.

Fabricating mold which includes coating fusible pattern with refractory composition to form a smooth, accurate mold lining, the step which comprises contacting coated pattern with organo-silicon halide to render refractory coating water-repellent. No. 2,388,299. Rudolf Thielemann to General Electric Co.

Producing industrial gas mixtures containing carbon monoxide and hydrogen. No. 2,388,348. Edward Stimson to British Celanese Ltd.

Preparation of p-cymene from a mono-cyclic terpene. No. 2,388,359. Washington Hull to American Cyanamid Co.

Reaction products of secondary alpihatic alcohol and formaldehyde and methods of producing same. No. 2,388,409. Mortimer Harvey to Harvel Research Corp.

Production of ketone resins which comprises heating substituted delta 2-cyclohexenone with aldehyde in presence of condensing agent and organic homogenizing solvent. No. 2,388,410. Vernon Haury to Shell Development Co.

Extracting fatty acids from tall oil by contacting same with liquefied, normally gaseous, hydrocarbon at elevated temperatures at which rosin is insoluble in liquefied hydrocarbons in continuous counter-current system. No. 2,388,412. Arthur Hixson and Ralph Miller to The Chemical Foundation, Inc.

Pyrolyzing a beta-chloroallyl ester. No. 2,388,440. Chessie Rehberg and Charles Fisher to United States of America as represented by the Secretary of Agriculture.

Organic sulphur compounds produced by reaction of quaternary ammonium hydroxides with carbon disulphide. No. 2,388,468. Jack Compton to The B. F. Goodrich Co.

Recovering pyrrole from mixture of heterocyclic nitrogen compounds from coal tar, containing pyrrole along with pyridine homologs including picoline selected from 3-picoline and 4-picoline. No. 2,388,475. Karl Engel to Allied Chemical & Dye Corp.

Recovering pure beta-picoline, from basic oil mixtures containing beta-picoline and gamma-picoline and 2,6-lutidine comprising combining latter two with cyclic aldehyde selected from aromatic aldehydes and furfural. No. 2,388,499. George Riethof to Pittsburgh Coke & Iron Co.

Removing hydrocarbon impurities from nitriles of class of propionitrile, normal butydronitrile, and iso-butydronitrile which comprises adding methyl alcohol to hydrocarbon-contaminated nitrile and distilling. No. 2,388,506. John Teter to Sinclair Refining Co.

Dehydration of water-contaminated, saturated nitriles of 3 to 4 carbon atoms which comprises adding nitrile other than that to be dehydrated and which forms with water an azeotrope. No. 2,388,507. John Teter and Walter Merwin to Sinclair Refining Co.

Production of 2-butylene from hydrocarbon mixture comprising 1-butylene and isobutylene. No. 2,388,510. Hervey Voge to Shell Development Co.

Electric transformer comprising sealed tank, inductively related windings therein, liquid halogenated hydrocarbon enveloping said windings, submerged sealed receptacle in tank containing liquid fixative capable of combining with gaseous halogen-containing decomposition products. No. 2,388,524. Frank Clark to General Electric Co.

Cyanoaminobenzenesulphonamide. No. 2,388,529. Gaetano D'Alelio and James Pyle to General Electric Co.

Resolving mixture of tetrachlorosilane and trimethylchlorosilane which comprises subjecting mixture to fractional distillation in presence of nitrile selected from acetonitrile and acrylonitrile. No. 2,388,575. Robert Sauer and Charles Reed to General Electric Co.

Preparing 2-isopropyl-4,6,7-trimethyl-5-hydroxycoumaran. No. 2,388,579. Lee Smith and John King to Regents of The University of Minnesota.

Reacting phenol with light oil fraction containing unsaturated hydrocarbon material. No. 2,388,583. Alger Ward to The United Gas Improvement Co.

Reacting phenol with light oil fraction containing unsatured hydrocarbon material. No. 2,388,584. Alger Ward to The United Gas Improvement Co.

An O-(carboxymethylthioalkyl) cellulose. No. 2,388,597. William Burke to E. I. du Pont de Nemours & Co.

Producing N-alkylated amine. No. 2,388,606. William Emerson.

Production of tertiary amines from nitrogen compounds. No. 2,388,607. William Emerson.

Production of secondary amines from nitrogen compounds. No. 2,388,-608. William Emerson.

Preparing alpha, beta unsaturated acid halides which comprises heating corresponding halogenated acid halide from group of chlorinated acid halides and brominated acid halides with catalyst from tertiary amines and salts thereof. No. 2,388,657. John Long to Wingfoot Corp.

Class of propiolyl halides consisting of the chloride, bromide, and iodide. No. 2,388,660. Frederic Schaefer to Wingfoot Corp.

An aroylamino-ortho-nitro-diphenylamine. No. 2,388,663. Christopher Argyle to British Celanese Ltd.

Purifying alkylated dihydroxydibenzanthrones in which hydroxyl groups are completely alkylated by removal of any incompletely alkylated hydroxy derivatives. No. 2,388,665. Ernest Beckett to Imperial Chemical Industries Ltd.

Subjecting to rectification a mixture of diasteroisomers composed of compound having two characterizing groups each containing asymmetric atom of opposite light rotating tendencies and like compound wherein two asymmetric atoms have same light rotating tendencies. No. 2,388,688. Henry Hass to Purdue Research Foundation.

Ring-closing 2,2'-dibenzanthronyl to dibenzanthrone which comprises dissolving 2,2'-dibenzanthronyl in sulfuric acid and heating in presence of arsenic acid. No. 2,388,743. Edward Howell to E. I. du Pont de Nemours & Co.

Making ethyl benzene by reaction of ethylene with benzene in presence of aluminum chloride catalyst whereby product containing unreacted benzene, ethyl benzene, polyethyl benzenes and catalyst is initially obtained. No. 2,388,758. Edward Mills, Jr. to Carbide & Carbon Chemicals Corp.

Cellulose ethers and process for producing same. No. 2,388,764. Frank Reichel and Ralph Cornwell to Sylvania Industrial Corp.

Ether having formula T-O-R, in which T is a terpene radical and R is a radical of unsaturated aliphatic alcohol containing not more than six carbon atoms. No. 2,388,765. Alfred Rummelsburg to Hercules Powder Co.

Decamethylene-1.10-dioxyacetic acid. No. 2,388,813. Charles Allen and James Van Allan to Eastman Kodak Co.

Maintaining concentration of butadiene cyclic dimer in furfural used in solvent extraction of butadiene at desirably low level. No. 2,388,834. Donald Douslin and Charles Weinaug to Phillips Petroleum Co.

Glycerol production. No. 2,388,840. Ellis Fulmer and Richard Hickey to Iowa State College Research Foundation.

An alkoxyalkyl alpha-ethacrylate. No. 2,388,844. Rudolph Hasche and William Utermohlen, Jr. to Eastman Kodak Co.

N-sec-butyl-p-nitroaniline. No. 2,388,886. Harold Von Bramer and Lee Davy to Eastman Kodak Co.

Producing improved azo-methine compounds comprising reacting primary arylamine with aromatic aldehyde in presence of dicyclohexylamine. No. 2,388,903. Troy Cantrell and John Peters to Gulf Oil Corp.

In absorption system wherein rich aqueous solvent having dissolved therein diolefins and acetylenes is obtained. No. 2,388,913. Ike Hall to Standard Oil Development Co.

Continuously synthesizing butadiene in reaction zone which comprises forming acetylene in zone by reacting calcium carbide with steam and feeding ethylene into zone where it contacts nascent acetylene. No. 2,388,916. Clinton Holder to Standard Oil Development Co.

Hydrogen fluoride alkylation process. No. 2,388,918. John Iverson to Universal Oil Products Co.

Alkylation of isoparaffins with olefins in presence of hydrogen fluoride catalyst wherein contaminated catalyst is removed from alkylation system and subjected to regeneration for recovery of purified hydrogen fluoride. No. 2,388,919. John Iverson to Universal Oil Products Co.

Separating and segregating diolefins from hydrocarbon mixtures containing diolefins and alkyl acetylenes which comprises contacting with basic cuprous salt solution, separating cuprous phase from unabsorbed hydrocarbons, and subjecting to successively higher temperatures to fractionally release diolefins. No. 2,388,928. Charles Morrell and Miller Swaney to Standard Oil Development Co.

Recovering olefins from alcohol-acid extracts. No. 2,388,929. Henry Mottern to Standard Oil Development Co.

Isomerizing normal paraffin of four carbon atoms per molecule in vapor phase, which comprises passing normal paraffin vapor together with hydrogen halide vapor through bed of aluminum chloride sorbed in a porous carrier, etc. No. 2,388,932. Henry Ogorzaly to Standard Oil Development Co.

Destructive hydrogenation of hydrocarbonaceous material which comprises reacting material mixed with hydrogen in presence of zinc chloride and aluminum oxide. No. 2,388,937. Louis Schmerling and Vladimir Ipatieff to Universal Oil Products Co.

Production of more valuable products from C3 and C4 gaseous olefins. No. 2,388,942. Gordon Zimmerman to Universal Oil Products Co.

Preparing drying oil substitute by pyrolysis of terpene hydrocarbons. No. 2,388,947. Carlisle Bibb and Robert Palmer to Newport Industries, Inc.

Recovery and regeneration of normal butenes from sulphuric acid solution thereof. No. 2,388,971. Henry Hibshman and William Knox, Jr. to Standard Oil Development Co.

Production of high-purity relatively low-boiling aromatic hydrocarbon and corresponding sulfonic acid. No. 2,389,041. David Gould to Allied Chemical & Dye Corp.

Producing 2-methyl-4 phenoxymethyl 5 cyano 6 chlor pyridine 3 carboxylic acid azide. No. 2,389,053. Max Hoffer to Hoffmann-La Roche, Inc.

Manufacture of nicotinic acid, heating quinolinic acid in indifferent liquid medium selected from nonaethylene glycol and mixture of toluol with nonaethylene glycol. No. 2,389,065. John Lee and Stephen Heineman to Hoffmann-La Roche, Inc.

Production of chlorinated carbocyclic carboxylic acids. No. 2,389,088. Frederick Schubart to American Cyanamid Co.

Making meso-alpha,beta-diamino succinic acid which comprises hydrogenating alpha,beta-bis-benzylamino succinic acid in solvent in presence of at least two equivalents of mineral acid and of noble metal catalyst. No. 2,389,099. Wilhelm Wenner to Hoffmann-La Roche, Inc.

Sulphones and process of preparing same. No. 2,389,127. Louis Bambas to Parke, Davis & Co.

Sulphones and method of preparing same. No. 2,389,128. Louis Bambas to Parke, Davis & Co.

Mixed ester of a dicarboxylic acid wherein one of ester groups is a dihydronordicyclopentadienyl group and other ester group is from a monohydric alcohol. No. 2,389,136. Herman Bruson to The Resinous Products & Chemical Co.

4' Methoxy 5 halogeno diphenylamino 2' carboxyl compound and process for producing same. No. 2,389,147. Ernest Friedheim and Ernst Borgmann.

Production of a trithio ortho ester of organic carboxylic acid having unsubstituted saturated hydrocarbon radical attached to carbonyl group. No. 2,389,153. John Kendall to Ilford Ltd.

Refining of coke-oven light oil. No. 2,389,172. Bernard van der Hoeven and John Unroe to Koppers Co., Inc.

Oxidation of alpha-glycols, which comprises mixing together alpha-glycol, red lead and glacial acetic acid. No. 2,389,187. James Drewitt to British Celanese Ltd.

Separating commingled azelaic acid, pelargonic acid and by-product acids from one another. No. 2,389,191. J. D. Fitzpatrick and Latimer Myers to Emery Industries, Inc.

Preparation of organic ester of cellulose of high degree of esterification. No. 2,389,195. Clifford Haney and Mervin Martin and Thomas McGoury to Celanese Corp. of America.

Producing diolefins comprising contacting admixture of mono-olefin and aldehyde with activated alumina. No. 2,389,205. Nat Marsh to Standard Oil Development Co.

Dehydrogenating a hydrocarbon. No. 2,389,215. Henry Singleton to Standard Oil Development Co.

Preparation of malononitrile which comprises heating mixture of cyanoacetamide, alkali metal chloride to ensure formation of a granular precipitate, and dehydrating agent of phosphorus oxychloride, phosphorus pentachloride, and mixtures thereof. No. 2,389,217. Alexander Surrey to Winthrop Chemical Co., Inc.

Reacting mixture containing tertiary alkyl chloride and secondary olefin with anhydrous chlorine. No. 2,389,230. Donald Blumer to Phillips Petroleum Co.

Production of 1,3-butadiene from 2,3-dichlorobutane. No. 2,389,231. Donald Blumer to Phillips Petroleum Co.

Countercurrent process for hydrolyzing fats with production of fatty acids and glycerine by bringing fat and water into contact with one another in enclosed reaction chamber. No. 2,389,246. Warren Davey to Colgate-Palmolive-Peet Co.

Converting paraffin hydrocarbons having four carbon atoms to isomers thereof which comprises contacting hydrocarbons with liquid catalyst consisting of anhydrous aluminum chloride. No. 2,389,250. Alfred Francis and William James to Socony-Vacuum Oil Co., Inc.

Refining non-acetylenic unsaturated hydrocarbon having non-cyclic double bond and associated in mixtures with acetylenic compound comprising contacting with Grignard reagent. No. 2,389,251. Raymond Franz to The United Gas Improvement Co.

Extracting 2:3 butanediol from a beer. No. 2,389,263. Alfred Liebmann and George de Beeze to Schenley Distillers Corp.

Saturating olefinic bonds of unsaturated fatty acids in tall oil which comprises treating tall oil with hydrogen in presence of nickel catalyst. No. 2,389,284. Joseph Turck, Jr. and John Ross to Colgate-Palmolive-Peet Co.

Manufacture of alpha-hydroxycarbonyl compounds of saturated and unsaturated cyclopentanopolyhydrophenanthrene series. No. 2,389,325. Tadeus Reichstein.

Production of polyhydric alcohol, which comprises subjecting hydroxyl-group-containing halogen derivative of polyhydric alcohol to heat in presence of copper or silver, said metal being prepared in finely divided and chemically reactive form, by reaction with sulphur dioxide of compound of metal. No. 2,389,347. Henry Dreyfus to Celanese Corp. of America.

Manufacturing synthetic camphor which comprises reacting p-cymene with reagent of group consisting of water and a mixture consisting of hydrogen and oxygen in presence of catalyst of mercury and mercury compounds. No. 2,389,389. Fryderyk Schwartz.

Producing normal and iso-olefins which comprises subjecting normal paraffin to simultaneous action of a dehydrogenating catalyst comprising alumina and promoter comprising compound of element selected from left-hand columns of Groups V and VI. No. 2,389,406. Herman Bloch and Raymond Schaad to Universal Oil Products Co.

Reaction products of aldehydes and triazine derivatives. No. 2,389,417. Gaetano D'Alelio and James Underwood to General Electric Co.

Producing styrene from hydrocarbon mixture containing mono- and polyethylbenzenes. No. 2,389,444. William Mattox to Universal Oil Products Co.

Producing mono ethyl benzene from poly ethyl benzene. No. 2,389,445. William Mattox and Wayne Benedict to Universal Oil Products Co.

Amides formed from mixture of saturated monocarboxylic acids containing from two to five cycloaliphatic rings per molecule and having generic formula $C^nH_{2^{n-x}}O^2$. No. 2,389,453. John Perrine to Sun Oil Co.

Manufacture of amines, process favoring production of high ratio of polyalkyl amines to non-alkyl amines. No. 2,389,500. Roland Goshorn to Sharples Chemicals Inc.

1,3-butadiene-1-phosphonic acid esters of 1 to 5 carbon atom alcohols. No. 2,389,576. Gennady Kosolapoff to Monsanto Chemical Co.

Paints, Pigments

Manufacture of paint, which comprises melting colophony with sulphur, dissolving molten mass in hydrocarbonaceous material selected from petroleum, heavy oil and naphtha, treating solution with aluminum compound, etc. No. 2,388,017. Herwart Sohm.

Treating oiticica oil to convert oil into fast-bodying oil having a Worstall test of 4 to 7 minutes. No. 2,388,257. Otto Eisenschiml and Gerald Eisenschiml to Otto Eisenschiml, Bertha Eisenschiml, Gerald Eisenschiml, and Rosalie Gingiss, as The Scientific Oil Compounding Co.

Pigmented alkyd resin. No. 2,388,301. William Waldie to The Commonwealth Engineering Co. of Ohio.

Manufacture of hydrated iron oxide pigments, which comprises precipitating hydrated ferric oxide from ferrous salt solution in presence of previously prepared seed slurry of hydrated ferric oxide having goethite crystal structure. No. 2,388,659. Lonnie Ryan and Herbert Sanders to Interchemical Corp.

Preparation of rutile titanium dioxide from hydrolysates which normally calcine to anatase. No. 2,389,026. Winfred Cauwenberg and Charles Tanner, Jr. to American Cyanamid Co.

Printing ink comprising suspension of pigment in vehicle consisting of resin dissolved in liquid polyglycol and liquid selected from pine oil and mono-terpinyl ethylene glycol ether to prevent "fill-in" in half-tone plates. No. 2,389,371. John Kroeger and Daniel O'Connor, Jr. to Fred'k H. Levey Co. Inc.

Paper, Pulp

Making coated paper which comprises applying aqueous suspension of mineral pigment and adhesive to a web of paper. No. 2,388,339. Clarence Paxton and Thomas Vail to The Champion Paper & Fibre Co.

Producing fibrous pulp from straw comprising impregnating straw with mineral acid, etc. No. 2,388,592. Arne Asplund and Johan Holst to Aktiebolaget Defibrator.

Process of manufacturing paper comprising applying to the web of paper a quickly acting gelatinizing solution to react on cellulose to gelatinize surface portions of the fiber. No. 2,389,254. Maurice Goldman to Saco-Lowell-Shops.

Petroleum

Cracking heavy hydrocarbon oils into high knock rating gasoline wherein vapors of hydrocarbon oil are contacted with suspended, solid cracking catalyst. No. 2,387,798. Naci Kubicek and Morris Carpenter to Standard Oil Co.

Isomerizing hydrocarbons which comprises treating hydrocarbon fraction consisting of saturated hydrocarbons with isomerization catalyst consisting of molten mixture comprising aluminum halide, hydrogen halide and halide of another metal which does not react with aluminum halide. No. 2,387,868. John Anderson, Sumner McAllister and William Ross to Shell Development Co.

Production of hydrocarbons from hydrocarbons of higher molecular weight by heating at 300° C., which comprises carrying out reaction in presence of catalyst containing compounds of barium and silicon. No. 2,388,008. Mathias Pier and Gerhard Free and Wilhelm Fuener.

Separating liquefiable hydrocarbons from residual gases in fluid flowed from distillate well at high pressure within retrograde condensation range of constituents of fluid, involving contacting vapors with lean absorption oil to absorb liquefiable hydrocarbons and produce a fat absorption oil. No. 2,388,048. Allen Garrison and William Yale to Texaco Development Corp.

Producing gasoline from heavy hydrocarbon oil in multi-stage operation. No. 2,388,055. Charles Hemminger to Standard Oil Development Co.

Stabilizing petroleum oil fraction of motor fuel range and containing unsaturated compounds, which comprises contacting in liquid phase with bed of activated clay catalyst. No. 2,388,076. Gerald Phillips to Standard Oil Development Co.

Reacting refinery C_4 cut free of olefins and containing normal butane in combination isomerization-fractionation operation in presence of aluminum halide and a hydrogen halide. No. 2,388,081. Anthony Robertson to Standard Oil Development Co.

Acid treating thermally cracked petroleum distillate to remove gumforming constituents. No. 2,388,087. William Ryan and Marcus Kendall to The Texas Co.

Recovering liquefiable hydrocarbons from distillate well fluids produced at high well-head pressure and temperature such that fluids are composed of liquid phase and a gas phase. No. 2,388,102. Frank West to The Texas Co.

Recovery of C_4 hydrocarbon fraction from refinery gases containing C_2-C_5 hydrocarbons. No. 2,388,322. Nelson Haskell to The Texas Co.

Hydrocarbon conversion process using organoaluminum halide, reacting halide with hydrogen halide to liberate aluminum halide. No. 2,388,428. Julian Mavity to Universal Oil Products Co.

Treatment of a complex hydrocarbon fraction to separate chemically similar components which comprises distilling complex hydrocarbon fraction in presence of alkyl nitrite. No. 2,388,429. Art McKinnis to Union Oil Co. of California.

Catalyst conversion system which is provided with plurality of catalytic reactors which are alternately on stream and undergoing catalyst regeneration and which is provided with flue gas heater for regulating temperature and composition of flue gases, a waste heat boiler for absorbing heat from regeneration gases, etc. No. 2,388,536. Robert Guinness to Standard Oil Co.

Apparatus for continuous conversion of hydrocarbon vapor which comprises rotary drum constituting reaction chamber provided with internal flights and having axial inlet and outlet at respective ends, etc. No. 2,388,642. Povl Ostergaard to Gulf Oil Corp.

Hydrocarbon motor fuel containing hydrocarbons within gasoline range and lead tetra-ethyl, solidified by lecithin. No. 2,388,719. Sol Wiczer.

Separation of olefinic hydrocarbon from hydrocarbon mixture containing it and more saturated hydrocarbon having same number of carbon atoms per molecule, by contacting mixture with normally liquid anhydride of a saturated aliphatic carboxylic acid. No. 2,389,144. Theodore Evans and Rupert Morris to Shell Development Co.

Producing olefin-free aviation grade fuel. No. 2,389,176. James Anderson to Standard Oil Development Co.

Production of viscous hydrocarbon oil of great stability and high viscosity index, comprising contacting liquid aliphatic hydrocarbon mixture containing low-boiling olefin with zirconium tetrahalide catalyst as sole polymerization agent. No. 2,389,240. James Reid to Phillips Petroleum Co.

Petroleum wash tank. No. 2,389,328. David Stilwell.

Subjecting normally liquid condensate obtained from hydrocarbon mixture occurring naturally in gaseous phase in distillate wells to fractionation to separate first fraction containing high octane components in motor fuel boiling range and second fraction containing low octane and heavier components. No. 2,389,342. Miller Conn to Phillips Petroleum Co.

Converting hydrocarbons which comprises passing endless belt of adsorbent porous fibers of silica-alumina hydrogel in continuous path including reaction zone, a regeneration zone and purge zone wherein belt is immersed in bath of molten lead, passing hydrocarbon vapors in contact with fibers. No. 2,389,378. Milton Marisic to Socony-Vacuum Oil Co Inc.

Conversion of hydrocarbons in presence of a particle form solid contact mass material. No. 2,389,493. Louis Evans to Socony-Vacuum Oil Co. Inc.

Catalytic alkylation process which comprises contacting reactants in presence of liquid mixture of aluminum halide and metal salt. No. 2,389,550. William Ross, Sumner McAllister, and John Anderson to Shell Development Co.

Treating used coke-oven gas petroleum wash oil to produce more readily removable resin. No. 2,389,570. Joseph Wells and Philip Wilson, Jr. to Carnegie-Illinois Steel Corp.

Photographic

Material for production of partial color selection pictures from subtractive multi-color images. No. 2,387,754. Bela Gaspar to Chromogen, Inc.

Printing by imbibition from dyed matrix to blank having dye absorptive layer. No. 2,387,914. John Kienninger to Technicolor Motion Picture Corp.

Photographic developing solution comprising developing agent and compound selected from alkali salts of aminomethane sulfonates and aminomethane sulfinates. No. 2,388,816. Frederic Bean to Eastman Kodak Co.

Photographic film having low shrink and swell amplitude, comprising support of vinyl chloride polymer and in order thereon, layer of polybutyl methacrylate, cellulosic subbing layer and emulsion layer. No. 2,388,817. Albert Beguin and Donald Swan to Eastman Kodak Co.

Photographic material sensitive to different regions of visible spectrum, comprising support having thereon single mixed grain emulsion layer containing coarse, high-speed silver bromide grains and fine, slow-speed silver bromide grains. No. 2,388,859. Leopold Mannes and Leopold Godowsky, Jr. to Eastman Kodak Co.

Coating composition for photographic purposes to give coatings of high transparency, consisting of aqueous solution of gelatin of 3-10% concentration, which sets at room temperature and as modifying agent, methyl cellulose. No. 2,388,881. Donald Swan to Eastman Kodak Co.

Developing exposed photographic material containing sensitive silver halide and silver halide developing agent, which comprises treating material with moist alkaline vapors. No. 2,388,894. Edward Yackel, John Leermakers and Cyril Staud to Eastman Kodak Co.

Color yielding element for recording photographic images comprising base having imposed thereon colloid layer containing basic N-substituted amino naphthalene dye intermediate. No. 2,389,575. James Kirby and David Woodward to E. I. du Pont de Nemours & Co.

Polymers

Preparation of hydrogen modified polymers of ethylene which comprises passing gaseous mixture of ethylene containing hydrogen in presence of catalyst selected from peroxy compounds and oxygen into high pressure resisting reaction zone. No. 2,387,755. William Hanford to E. I. du Pont de Nemours & Co.

Manufacturing electrical condenser that comprises insulating plurality of metal strips by coating same with polystyrene in solution in a solvent. No. 2,387,759. Kenneth Jarvis.

Polymerizing normal olefins having 3 to 6 carbon atoms. No. 2,387,784. Robert Thomas and Harold Reynolds, Jr. to Standard Oil Development Co.

Plastic composition containing water-insoluble, originally alcohol-soluble resinous partial acetal of polyvinyl alcohol and aliphatic monoaldehyde combined with aliphatic dicarbonylic compound of group consisting of glyoxal and methyl glyoxal. No. 2,387,831. Howard Cogan and Richard Quarles to Carbide and Carbon Chemicals Corp.

Water-insolubilizing water soluble solid polyvinyl alcohol which comprises treating solid alcohol with solution of sulfuric acid and methanol, etc. No. 2,387,833. Joseph Dahle to Pro-phy-lac-tic Brush Co.

Lamp changer comprising a pole, a pair selected from polyvinyl chloride, polyvinyl chloride-acetate, and polyvinyl butyral, and as a plasticizer for resin a hexide diester. No. 2,387,841. Rudolph Goepp, Jr. to Atlas Powder Co.

Preparing synthetic resin which comprises flowing mixture of diene hydrocarbon and unsaturated glyceride oil through a tube. No. 2,387,895. Howard Gerhart to Pittsburgh Plate Glass Co.

Producing mixture of poymethylene diamine, N-alkyl polymethylene diamine and N,N' dialkyl polymethylene diamine. No. 2,388,034. Burnard Biggs to Bell Telephone Laboratories, Inc.

Linear polyamide identical with polyamide prepared by condensation of polymethylene dicarboxylic acid and a mixture of a diprimary polymethylene diamine, a polymethylene diamine, etc. No. 2,388,035. Carl Frosch to Bell Telephone Laboratories, Inc.

Polymerization of ethylene in presence of catalyst selected from oxygen and peroxy catalysts. No. 2,388,138. Crawford Greenewalt to E. I. du Pont de Nemours & Co.

Hardenable aminotriazine-aldehyde condensation product mixed with curing catalyst selected from ammonium silicofluoride and borofluoride. No. 2,388,143. Raymond Harris to American Cyanamid Co.

Heating fatty material selected from ricinoleic acid, soaps of ricinoleic acid, etc., with alkaline agent whereby product containing polyunsaturated compounds having conjugated double bonds is formed. No. 2,388,158. Hans Kirschenbauer to Colgate-Palmolive-Peet Co.

Fractionation of solid polymers of ethylene obtained by polymerization of ethylene in presence of oxygen as catalyst. No. 2,388,160. Norman Krase to E. I. du Pont de Nemours & Co.

Effecting copolymerization of butadiene-1,3 hydrocarbons with monomeric olefinic compounds, which comprises conducting copolymerization in presence of an alpha,beta-unsaturated aldehyde. No. 2,388,167. Kenneth Marple to Shell Development Co.

Curing interpolymer of ethylene and an organic monocarboxylic acid ester of vinyl alcohol which comprises heating with sulfur to obtain elastomer. No. 2,388,169. Ambrose McAlevy, Daniel Strain, and Franklin Chance to E. I. du Pont de Nemours & Co.

Polymerizing ethylene which comprises subjecting ethylene to elevated temperatures and pressures in presence of free oxygen, water, and alkali. No. 2,388,178. Merlin Peterson to E. I. du Pont de Nemours & Co.

Rigid laminated article consolidated by heat and pressure comprising plurality of layers of cellulose fibrous material and embedded therein layer of glass cloth, bonded with synthetic, thermosetting amino plastic resin. No. 2,388,184. Kurt Ripper to American Cyanamid Co.

Composition including organo-soluble cellulose ether, plasticizer, and, as release agent, a polyglycol ester of an organic carboxylic acid. No. 2,388,206. Harry Boulton and Albert Savage to The Dow Chemical Co.

Polymerizing ethylene, which comprises carrying on reaction in aqueous menstruum, at a pH in range of 7-11, in presence of alkali persulfate polymerization catalyst. No. 2,388,225. Richard Brooks, Merlin Peterson and Arthur Weber to E. I. du Pont de Nemours & Co.

Exchanging anions in fluid media, which comprises contacting anion-containing fluid medium with water-insoluble reaction product of melamine, diethylene triamine, 37.5% formaldehyde solution and sodium hydroxide, that has been gelled. No. 2,388,235. Philip Bowman and Harry Burrell to Heyden Chemical Corp.

Insolubilizing a solid polyvinyl alcohol which comprises reacting mixture of alkyl alcohol, aldehyde and acetalization catalyst. No. 2,388,238. Joseph Dahle to Pro-Phy-Lac-Tic Brush Co.

Separation of polyamide resulting from polymerization of hexamethylene diamine and adipic acid from solid reaction mass. No. 2,388,278. Robert Moncrieff and Edward Wheatley to Celanese Corp. of America.

Molding composition which can be heated and pressure molded to form molded article having good dimensional stability and good electrical properties which comprises filler and a resin mixture consisting of fusible melamine-formaldehyde resin and fusible aniline-shellac-formaldehyde resin. No. 2,388,293. Paul Schroy, Joseph Grabowski and Milton Scott to American Cyanamid Co.

From Official Gazette—Vol. 579, No. 5—Vol. 580, Nos. 1, 2, 3 (Oct. 30-Nov. 20)—p. 648

Polydecamethylene dihydromuconate of high molecular weight to permit it to be cold drawn into fibres showing crystalline orientation along fibre axis. No. 2,388,318. Carl Frosch to Bell Telephone Laboratories, Inc.

Infusible insoluble polymer produced by curing, with organic peroxide, a fusible microcrystalline dihydroxy aliphatic hydrocarbon-dicarboxy aliphatic hydrocarbon polyester, said polyester possessing crystallinity and linear growth to impart property of cold drawing. No. 2,388,319. Calvin Fuller to Bell Telephone Laboratories, Inc.

Non-fibrous, transparent regenerated cellulose base sheet coated with moistureproofing composition having incorporated therein finely divided 1,2-dihydronaphthalene polymer. No. 2,388,326. William Hyden and James Mitchell to E. I. du Pont de Nemours & Co.

Subjecting conjugated butadiene, to polymerization in aqueous emulsion in presence of heavy metal catalyst obtained by combination of water-soluble heavy metal salt and saturated aliphatic carboxylic acid. No. 2,388,372. William Stewart to The B. F. Goodrich Co.

Subjecting conjugated butadiene, to polymerization in aqueous emulsion in presence of heavy metal catalyst obtained by combination of water soluble heavy metal salt and aliphatic polycarboxylic acid. No. 2,388,373. William Stewart to The B. F. Goodrich Co.

Polymerizing butadiene-1,3 hydrocarbon in presence of compound containing monovalent aryl group attached to carbon atom of 2-thiothiazyl group. No. 2,388,477. Charles Fryling to The B. F. Goodrich Co.

Modifiers for polymerization of butadiene-1,3 hydrocarbons. No. 2,388,514. Benjamin Zwicker and William Stewart to The B. F. Goodrich Co.

Polymerizing butadiene-1,3 hydrocarbon in presence of compound containing alkyl group attached to ring carbon atom of 2-thio-arylenethiazyl group. No. 2,388,515. Benjamin Zwicker and William Stewart to The B. F. Goodrich Co.

Additional patents on all other classifications from the above volumes will be given next month.

Abstracts of Canadian Patents

Collected from Original Sources and Edited

Requests for further information or photostated copies of the patents reported below should be addressed to the Commissioner of Patents and Copyrights, Department Secretary of State, Ottawa, Canada.

CANADIAN PATENTS

Granted and Published Nov. 20, 1945

Method of sealing open ends of collapsible containers by means of molten metal. No. 431,307. Otto Johanness Bruun.

Delignification of wood by chlorination below 40 Cent. in two stages, with chlorination products being removed at the end of each stage. No. 431,313. Henry Dreyfus.

Cake form detergent composition consisting of neutral, water-soluble salt of an anion-active non-polar derivative of sulphuric acid having single open-chain hydrocarbon groups of 12-14 carbon atoms and organic amido body. No. 431,335. Allied Chemical and Dye Corp. (L. H. Flett)

Substituted phenoxy compound having at least one member of the group consisting of chlorine, bromine, iodine, methyl, amino and nitro substituted in the benzene ring, useful as plant hormone. No. 431,348. Boyce Thompson Institute for Plant Research (P. W. Zimmerman, A. E. Hitchcock)

Delignification of wood by boiling with a dilute solution of alkalies and chlorinating with 2 per cent chlorine solution below 40°C. No. 431,313. Henry Dreyfuss.

Electrically heated, rotatingly arranged drum type furnace. No. 431,316. Hans Gallusser.

Cake form detergent comprising alkali metal salt of alkyl sulphate containing 12 to 14 carbon atoms admixed with urea, the sulphate not exceeding ten per cent weight of mixture. No. 431,335. Allied Chemical and Dye Corp. (L. H. Flett).

Aluminum base alloy containing 20-40 per cent beryllium; 0.1—2 per cent magnesium; 0.25—4 per cent copper; and 0.25—6 per cent zinc; with remainder aluminum. No. 431,336. Aluminum Co. of America (L. W. Kempf, W. A. Dean).

Stable dicyandiamide-aldehyde amino syrup, prepared by inter-reaction of foregoing in presence of a melamine-aldehyde hydrophilic sol. No. 431,342. American Cyanamid Co. (K. E. Ripper).

Plant hormone consisting of substituted phenoxy compound having at least one member of chlorine, bromine, iodine, methyl, amino or nitro group, substituted for hydrogen in the benzene ring. No. 431,348. Boyce Thompson Institute for Plant Research, Inc. (P. W. Zimmerman, A. E. Hitchcock).

Cold drawn copolymer of 70 per cent acrylonitrile, 25 per cent dibutyl itaconate and 5 per cent diethyl itaconate. No. 431,355. Canadian General Electric Co. Ltd. (G. F. D'Alelio).

Water repellent fabrics treated with dodecyl isothiocyanate at 80°-160° C. No. 431,357. Canadian Industries Ltd. (W. E. Hanford, D. F. Holmes).

Acid and water-resistant cement prepared by addition of sodium stearate, sodium or potassium silicate and alkali silicofluorides as setting accelerators. No. 431,358. Canadian Industries Ltd. (Robert Ward).

Milling resinous, homopolymeric polymethyl methacrylate at 125°-200° C. with dodecyl mercaptan to reduce solution viscosity of polymer in toluene. No. 431,359. Canadian Industries Ltd. (E. K. Bolton).

Moistureproof coating composition comprising essentially a 12 per cent solution in toluene of 10 parts wax, 90 parts cyclized rubber and 2 parts tetraethyl diamino diphenyl methane. No. 431,364. Canadian Industries Ltd. (J. A. Mitchell).

Preparation of paints, enamels and the like containing a pigment which forms a soft, readily redispersible sediment on standing which comprises mixing a solution of ethyl cellulose with a coating composition. No. 431,365. Canadian Industries Ltd. (L. Balassa).

Modified blasting gelatin comprising at least 90 per cent nitroglycerin, nitrocellulose, and between 0.1 and 5.0 per cent of manganese dioxide. No. 431,366 Canadian Industries Ltd. (C. O. Davis and H. H. Fassnacht).

Colourless, transparent regenerated cellulosic sheet wrapping material having associated therewith *pp'*-bis-*p*-(*p*-amino-benzamido-) benzamido-stilbene-di-alkali metal sulphonate sufficient to effect substantially complete absorption of light of the wave length of 3000 to 3800 A. No. 431,367. Canadian Industries Ltd. (B. Van Every).

Process for the manufacture of resinous aldehyde condensation products containing melamine. No. 431,369. Ciba Products Corp. (Willi Fisch).

Bonding together sheets formed of magnesium or deformable magnesium-base alloys by rolling the unbonded sheets together at a temperature between 750° and 900° F. at rate of reduction in thickness of at least 40 per cent per pass through the rolls. No. 431,377. Dow Chemical Co. (H. A. Diehl and J. C. McDonald).

Luminescent screen comprising a mixture of silver activated zinc sulphide and manganese activated zinc borate. o. 431,380. Electric & Musical Industries Ltd. (S. T. Henderson).

Fluorescent screen comprising a mixture of blue cathodo-luminescent calcium, sulphide and yellow cathodo-luminescent zinc beryllium silicate, wherein the limits of the ratio of weight of said sulphide, to silicate are between 2 to 1 and 1 to 3. No. 431,382. Electrical & Musical Industries Ltd. (S. T. Henderson and E. W. Fogg).

Trisazo dyestuff. No. 431,387. J. R. Geigy (A. Jenny and A. Pedolin).

Insecticide containing as its essential active ingredient one of the class of compounds known as xanthones. No. 431,389. General Chemical Co. (L. E. Smith).

Combating codling moth larvae infestations on pome fruit trees, which comprises spraying the trees with lead arsenate and thereafter with a compound containing the xanthone structure. No. 431,390. General Chemical Co. (J. W. Swaine).

Production of ornamental effects on plastic material, which comprises immersing cellulose acetate containing diethyl phthalate and triphenyl phosphate and having a resist thereon, in an etching bath of a sulphuric acid solution of a temperature of 50° to 75° C. No. 431,443. Camille Dreyfus (W. Horback and W. Dempsey).

Granted and Published Nov. 27, 1945.

Granted and Published Nov. 27, 1945

Dental impression material consisting of sodium, potassium, and ammonium pectate, and of the soluble and slightly soluble salts of calcium, barium and strontium. No. 431,495. Coe Laboratories Inc. (V. V. Vallandigham).

Solid elastic products resulting from reacting acrylic nitrile and a butadiene with a natural rubber composition, said products having high resistance to the solvent action of benzene. No. 431,498. Dominion Rubber Co., Ltd. (H. Romeyn, Jr.).

Reclaiming scrap containing vulcanized polychloroprene by heating in a comminuted condition in the presence of water between 300° and 420°F. in the presence of an amine. No. 431,499. Dominion Rubber Co., Ltd. (W. G. Kirby and P. M. Elliott).

Reclaiming scrap containing elastic polycholorprene which is free of cellulose fibres which comprises mixing therewith 5 to 20 per cent by weight of cellulose fibres, and heating in the presence of water at 300° F. to 420° F. No. 431,500. Dominion Rubber Co. Ltd. (W. G. Kirby and L. E. Steinle).

Hydraulic cement comprising the finely divided heat-reaction product of 45-70 mol. per cent Al_2O_3, 10-50 mol. per cent SrO and 20-48 mol. per cent CaO. No. 431,515. Kerr Dental Mfg. Co. (O. T. Zimmerman).

Protection of magnesium and magnesium base alloys against corrosion, by first treating the metal with a solution containing manganous sulphate, and to form a film of manganous hydroxide then treating the metal with an aqueous solution of an oxidizing salt to produce manganese dioxide. No. 431,518. Magnesium Elektron Ltd. (C. J. Bushrod).

Dicyclopentyl adipate, No. 431,535. Shell Development Co. (T. W. Evans and J. R. Scheibli).

A quick acting process of chemically resharpening files. No. 431,550. Trans-American Development Corp. (S. M. Cleja and J. W. Hladky).

Method of coating paper with a benzene-soluble copolymer of vinyl chloride and vinylidene chloride which comprises applying a thin solution of the copolymer to the paper and evaporating solvent. No. 431,555. Wingfoot Corp. (A. J. Seitz).

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

418,161. American Oil & Supply Co., Newark, N. J.; filed Nov. 9, 1944; Serial No. 476,272; for antifriction bearing lubricants; since Sept. 15, 1944.

418,162. American Oil & Supply Co., Newark, N. J.; filed Nov. 9, 1944; Serial No. 476,273; for gear lubricants; since Sept. 15, 1944.

418,177. Wyandotte Chemicals Corp., Wyandotte, Mich.; filed Apr. 6, 1945; Serial No. 481,822; for sodium silicate composition for industrial cleaning; since May 29, 1941.

418,416. The Tremco Manufacturing Co., Cleveland, Ohio; filed Nov. 14, 1944; Serial No. 476,452; for putty substitute; since Oct. 25, 1944.

469,876. Oxy-Ferrolene Ltd., Leicester, England; filed May 2, 1944; for gaseous fuels; since July 29, 1939.

472,781. Kraus Ceramic Products Co. Inc., Sparks, Md.; filed July 31, 1944; for mineral colloidal slurry as bond for ceramics; since Sept. 25, 1934.

473,639. Exola Products Co., Los Angeles, Calif.; filed Aug. 26, 1944; for oil; since August 1939.

475,149. Exola Products Co., Los Angeles, Calif.; filed Oct. 10, 1944; for compound which increases time of combustion in combustion chamber and octane rating; since June 1944.

475,509. C. H. Ores & Processing Ltd., London, England; filed Oct. 19, 1944; for lignocellulosic material; since May 1944.

477,761. Thomas W. Dunn Co. Inc., N. Y.; filed Dec. 20, 1944; for flexible glues; since Jan. 1, 1937.

477,934. Koppers Co. Inc., Kearny, N. J.; filed Dec. 26, 1944; for scented insecticide; since December 1918.

478,395. Koppers Co. Inc., Kearny, N. J.; filed Jan. 8, 1945; for insecticides and naphthalene; since 1942.

478,837. L. Sonneborn Sons, Inc., N. Y.; filed Jan. 20, 1945; for processing of textile yarns; since 1940.

479,282. Faesy & Besthoff, Inc., N. Y.; filed Feb. 1, 1945; for neutral tri-based copper sulphate; since Dec. 12, 1944.

480,255. Witco Chemical Co., Chicago, Ill.; filed Feb. 26, 1945; for hydrated yellow iron oxide as pigment in inks; since January 1930.

480,576. The C. P. Hall Co., Akron, Ohio; filed Mar. 7, 1945; for cerium oxide as abrasive, etc.; since Nov. 30, 1943.

480,577. The C. P. Hall Co., Akron, Ohio; filed Mar. 7, 1945; for rubber compounding ingredients, etc.; since Nov. 30, 1943.

480,580. The C. P. Hall Co., Akron, Ohio; filed Mar. 7, 1945; for paint pigments; since Mar. 30, 1943.

481,212. The Consolidated Mining & Smelting Co. of Canada, Ltd., Montreal, Quebec; filed Mar. 23, 1945; for cadmium, mercury, indium, bismuth, and tin; since Mar. 21, 1916.

481,817. Wyandotte Chemicals Corp., Wyandotte, Mich.; filed Apr. 6, 1945; for inorganic alkaline composition for laundry; since Dec. 15, 1941.

481,994. Herbert J. Heribert, N. Y.; filed Apr. 11, 1945; for textiles for water, mildew, flame, and moth-proofing; since Sept. 1, 1944.

482,660. Stora Kopparsbergs Bergslags Aktiebolag, Falun, Sweden; filed Apr. 26, 1945; for chemical wood pulp; since Nov. 8, 1944.

484,514. Allied Chemical & Dye Corp., N. Y.; filed June 14, 1945; for dyestuffs; since Apr. 10, 1945.

484,914. The Solvay Process Co., N. Y.; filed June 22, 1945; for complex organic sodium sulfonates; since Apr. 3, 1945.

485,163. L. Sonneborn Sons, Inc., N. Y.; filed June 28, 1945; for U.S.P. mineral white mineral oil; since Oct. 1, 1933.

485,322. American Chemical Paint Co., Ambler, Pa.; filed July 2, 1945; for adherent coating upon aluminum; since May 22, 1945.

485,399. California Spray-Chemical Corp., Wilmington, Del.; filed July 3, 1945; for herbicides; since June 5, 1945.

485,436. Continental Commodities Corp., N. Y.; filed July 4, 1945; for tartaric acid, geranium oil, and menthol; since Oct. 1, 1944.

485,495. Herbert J. Heribert, N. Y.; filed July 6, 1945; for coatings for leather; since Sept. 1, 1944.

485,661. Standard Oil Co., Louisville, Ky.; filed July 10, 1945; for technical white mineral oils; since January 1923.

485,733. Miranol Chemical Co. Inc., Irvington, N. J.; filed July 12, 1945; for synthetic detergents; since June 1941.

485,734. Miranol Chemical Co. Inc., Irvington, N. J.; filed July 12, 1945; for soapless detergent; since June 1941.

485,808. Arrow Engineering & Chemical Co. Inc., Flint, Mich.; filed July 14, 1945; for insect spray; since July 5, 1945.

485,924. Rheem Research Products, Inc., Baltimore, Md.; filed July 17, 1945; for producing corrosion resistant coating on metals; since July 10, 1945.

485,943. Cooperative Seed & Farm Supply Service, Inc., Richmond, Va.; filed July 18, 1945; for making insecticides and fungicides; since Mar. 2, 1942.

485,960. The Refinite Corp., Omaha, Nebr.; filed July 18, 1945; for aluminum silicate, in water softening apparatus; since Jan. 1, 1939.

486,255. Hercules Powder Co., Wilmington, Del.; filed July 25, 1945; for carboxymethylcellulose; since July 13, 1945.

486,408. Hercules Powder Co., Wilmington, Del.; filed July 28, 1945; for cellulose acetatepropionate; since July 13, 1945.

486,409. Hercules Powder Co., Wilmington, Del.; filed July 28, 1945; for chlorinated paraffin; since July 13, 1945.

486,416. La Motte Chemical Products Co., Towson, Md.; filed July 28, 1945; for chemical for discovering titanium or iron; since March 1944.

486,540. Oil and Gas Research, Inc., Wilmington, Del.; filed July 31, 1945; for carbon black; since July 3, 1945.

486,541. Oil and Gas Research, Inc., Wilmington, Del.; filed July 31, 1945; for carbon black; since July 3, 1945.

486,732. American Cyanamid & Chemical Corp., N. Y.; filed Aug. 6, 1945; for medium for heat treatment of metals; since December 1943.

487,130. General Aniline & Film Corp., N. Y.; filed Aug. 14, 1945; for light sensitive diazotype papers; since May 12, 1945.

Trademarks reproduced and described include those appearing in the Official Gazette of the U. S. Patent Office, November 27 to December 18, 1945.

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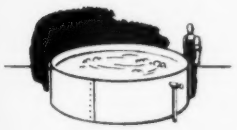

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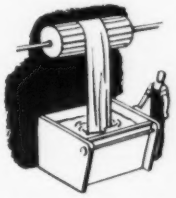

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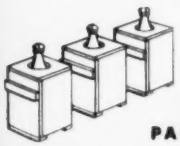

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